Davis

TP 10376E

Development of a Level Change System for Federally Subsidized Vessels
Phase 1 - Problem Definition/Concept Development

Prepared for:

Transportation Development Centre Policy and Coordination Group
and Marine Policy & Program Transport Canada

CA1
DTC800-
90
D24

41.D

91-03625/

CA1
DTC800-
90
D24

459687

41.D

FINAL REPORT

TP 10376E

Development of a Level Change System for Federally Subsidized Vessels Phase 1 - Problem Definition/Concept Development

Prepared for:

Transportation Development Centre Policy and Coordination Group and Marine Policy & Program Transport Canada

Prepared By:

A.J. Coppens, D. Vandam & P. Belloni

W.R. DAVIS ENGINEERING LIMITED
Consulting Engineers
Ottawa, Ontario

R. Rutherford & G. Paterson

GERMAN and MILNE
Naval Architects & Marine Engineers
Ottawa, Ontario

and

F. Ginpil

HUMANTECH INCORPORATED
Toronto, Ontario

Library and Information Centre
Centre de Documentation (CSLA)
RECEIVED - REÇU LE
AUG 9 1990
Transport Canada / Transports Canada

89123.FR

MAY 1990

DDN 444743

The contents of this report reflect the views of the authors and not necessarily the official view or opinions of the Transportation Development Centre of Transport Canada.

Le contenu de ce rapport reflète l'opinion des auteurs qui n'est pas forcément l'opinion officielle du Centre de développement des transports, Transports Canada.

PROJECT TEAM

A.J. Coppens	Project Manager, W.R. Davis Engineering Limited
D. VanDam	W.R. Davis Engineering Limited
P. Belloni	W.R. Davis Engineering Limited
R. Rutherford	German & Milne
G. Paterson	German & Milne
F. Ginpil	Humantech Inc.

Transport Canada / Transports Canada

PUBLICATION DATA FORM

1. Transport Canada Publication No.	2. Project No.	3. Recipient's Catalogue No.
TP10376 E	7158	

4. Title and Subtitle	5. Publication Date
Development of a Level Change System for Federally Subsidized Vessels - Phase I Problem Definition/Concept Development	March 1990
	6. Performing Organization Document No.: 89123
7. Author(s): A.J. Coppens, D. VanDam, P. Belloni, R. Rutherford, F. Ginpil	8. Transport Canada File No.: D 1450-103-96
9. Performing Organization Name and Address: W.R. Davis Engineering Limited, 1260 Old Innes Road, Ottawa, Ontario, K1B 3V3	10. DSS File No.: 15 SD.T8200-8-8531-A
	11. DSS or Transport Canada Contract No.: T8200-8-8531/01/SD
12. Sponsoring Agency Name and Address: Transportation Development Center, 200 Rene Levesque Blvd. West, Suite 601, West Tower, Montreal, Quebec, H2Z 1X4	13. Type of Publication and Period Covered: Final
	14. Project Officer: Barbara Smith

15. Supplementary Notes (Funding programs, titles of related publications, etc.)

16. Abstract: A federally subsidized ferry service on Canada's East Coast was evaluated for accessibility for disabled and elderly persons. The evaluation included a detailed assessment of the problems associated with transferring passengers from one deck to another aboard the two vessels (Prince Nova and Prince Edward). Concepts for a level change system were developed based on this assessment for boarding and between deck transfers of disabled passengers. In addition to this, other barriers to accessibility for disabled passengers were evaluated with regard to the vessels and the terminals from which they sail. Concepts for the level change system were then developed based on a set of design requirements which included safety, technical, cost and passenger considerations. These concepts were evaluated based on evaluation criteria which were developed and one system selected. A follow-on plan for implementation consisting of detailed design and construction as well as an evaluation of the system was then developed.

17. Key Words	18. Distribution Statement
Accesibility, Handicapped, Disabled, Level Change, Ferry, Transportation	Limited number of copies available from Transportation Development Centre on request

19. Security Classification (of this publication)	20. Security Classification (of this page)	21. Declassification (date)	22. No. of Pages	23. Price
Unclassified	Unclassified	---	176	---

Transports Canada Transport Canada

FORMULE DE DONNÉES POUR PUBLICATION

1. N° de la publication de Transports Canada	2. N° de l'étude	3. N° de catalogue du destinataire
TP 10376E	7158	

4. Titre et sous-titre	5. Date de la publication
Development of a Level Change System for Federally Subsidized Vessels Phase I - Problem Definition/Concept Development	Mars 1990
	6. N° du document de l'organisme exécutant: 89123

7. Auteur(s)	8. N° de dossier — Transports Canada
A. J. Coppens, D. Vandam, P. Belloni, R. Rutherford & F. Gimpil	DI450-103-96

9. Nom et adresse de l'organisme exécutant	10. N° de dossier — ASC
W. R. Davis Engineering Limited 1260 Old Innes Road Unit 605 Ottawa (Ontario) K1B 3V3	15SD T8200-8-8531-A
	11. N° de contrat — ASC ou Transports Canada: T8200-8-8531/01/SD

12. Nom et adresse de l'organisme parrain	13. Genre de publication et période visée
Centre de développement des transports 200 ouest, boul. René-Lévesque Tour ouest, suite 601 Montréal (Québec) H2Z 1X4	Final
	14. Agent de projet: Barbara A. Smith

15. Remarques additionnelles (Programmes de financement, titres de publications connexes, etc.)

16. Résumé

Ce projet avait pour objet d'évaluer l'accessibilité aux personnes âgées et aux handicapés d'un service de traversiers de la côte Est du Canada, subventionné par le gouvernement fédéral. Il s'agissait d'abord d'évaluer les problèmes liés aux déplacements de cette catégorie de passagers entre les ponts des deux traversiers en cause (le Prince Nova et le Prince Edward). Par la suite, divers concepts de transport vertical ont été élaborés en fonction des résultats de l'évaluation menée. En outre, les autres obstacles aux déplacements des passagers handicapés à bord des traversiers comme dans les installations terminales ont également été évalués. Divers systèmes élévateurs ont ensuite été étudiés, en tenant compte de critères tels que la sécurité, la faisabilité, le coût et les besoins des usagers. Enfin un plan de réalisation prévoyant l'étude détaillée, la construction et l'évaluation du système choisi a été établi.

17. Mots clés	18. Diffusion
Accessibilité, handicapés, passagers à mobilité réduite, appareils élévateurs, traversiers.	Le Centre de développement des transports dispose d'un nombre limité d'exemplaires.

19. Classification de sécurité (de cette publication)	20. Classification de sécurité (de cette page)	21. Déclassification (date)	22. Nombre de pages	23. Prix
non classifiée	non classifiée	-	176	

CDT/TDC 79-005
Rev 88

Canada

SUMMARY

This project involved the evaluation of accessibility for disabled and elderly passengers on two federally subsidized ferries (the Prince Nova and the Prince Edward) and the terminals from which the vessels sail (the Caribou Terminal in Nova Scotia and the Wood Islands Terminal in Prince Edward Island (PEI)). This service is operated by Northumberland Ferry Services in Charlottetown, PEI.

The primary objective in the project was to develop concepts for a level change system for boarding and between deck transfers of disabled passengers on the vessels. A secondary objective was to evaluate other barriers to accessibility on the vessels and at the terminals for disabled and elderly passengers.

The work conducted included a survey of the vessels and terminals to identify and assess the constraints with respect to level changes and other areas of concern with respect to accessibility. Relevant safety standards and recommended practices, as well as operating procedures, were reviewed and information on possible level change systems was obtained. From the above, a set of design requirements and technical specifications were developed for the level change system based on the following considerations:

- safety, including applicable safety standards and guidelines for elevating devices
- size/capacity
- reliability/maintainability
- environmental factors
- vessel interfacing and stability
- ergonomics
- Coast Guard requirements
- cost effectiveness.

Based on the above criteria three level change concepts were developed. These were a shipboard elevator and wheelchair lift system, a dockside elevator system, and a dockside ramp system.

The shipboard elevator and wheelchair lift system would provide access for the disabled from the vehicle deck to the mezzanine deck by the use of the recommended wheelchair lift. Service to the promenade deck and the bridge deck would be provided by a cable suspension configuration or a hydraulically operated elevator. No additional crew members would be required to operate the proposed system based on expected usage rates.

The dockside elevator system would consist of an elevator located on the dock which would provide access for the disabled to the promenade deck. This system would require an adjustable ramp between the ship and the elevator to allow for height variations due to tides and ship loading states (approximately 3.5 m). An attendant would be required to load and unload the disabled passenger's vehicle.

The dockside ramp system would consist of an inclined ramp leading to the promenade deck. As with the dockside elevator system, an adjustable ramp (approximately 3.5 m) between the system and the ship would be required to allow for ship height variations due to tides and ship loading states. Additional crew member requirements would be similar to the dockside elevator system.

The concepts were evaluated and the most suitable one selected based on factors including cost, ship integration/impacts, operational considerations, safety, and suitability for disabled users. Based on this evaluation, the shipboard elevator and wheelchair lift system was selected.

The on-board system meets all of the requirements for between deck transfers of wheelchair and other disabled passengers and satisfies the federal government's mandate to provide accessible transportation services for disabled persons.

A follow-on plan for implementation was then developed which included a detailed design, construction and installation phase and an evaluation phase.

The cost for design, construction and installation phase is estimated to be $350,000 for both vessels and will take approximately 9 months to complete. The evaluation phase will consist of conducting and documenting the evaluations. It is recommended that the evaluation be conducted over one sailing season. The estimated cost is $29,000.

In addition to the level change problem, the evaluation of accessibility for the disabled and elderly passengers on the vessels revealed several major concerns which included the lack of a wheelchair accessible washroom; coamings on door sills to prevent water flooding; seating and access to self serve food in the cafeteria; and narrow, steep stairs between decks.

There were no major accessibility barriers at the terminals. It was however noted that the entrance doors were heavy and required a significant effort to open; and access to some of the facilities, including the cafeteria was less than ideal, particularly at the Wood Islands terminal.

Based on this study, it is concluded that there is no convenient method to allow level change between the ferry decks for disabled persons, particularly those confined to wheelchairs. In addition, other accessibility problems for persons with disabilities exist at the terminals and on board the ferries.

It is therefore recommended that a shipboard elevator and wheelchair system be installed on both vessels.

For the ferries it is also recommended that the other accessibility problems be rectified especially regarding the washrooms, coamings at door sills, cafeteria and stairs.

For the terminals it is recommended that the entrance doors be made easier to open; more space be provided for wheelchair traffic in the cafeteria seating area; and accessibility to the gift shop and cafeteria at the Wood Islands terminal be improved by adding ramps and/or wheelchair lifts.

SOMMAIRE

Ce projet avait pour objet d'évaluer l'accessibilité aux handicapés et aux personnes âgées de deux traversiers (le Prince Nova et le Prince Edward) ainsi que des gares qu'ils desservent (la gare Caribou en Nouvelle-Ecosse et la gare Wood Islands à l'Ile-du-Prince-Edouard). Ce service de traversée est exploité par la Northumberland Ferry Services de Charlottetown, et subventionné par le gouvernement fédéral.

Le but premier du projet était d'étudier des appareils élévateurs pour l'embarquement des passagers handicapés et leur déplacement entre ponts. En second lieu, il s'agissait de repérer et d'évaluer les autres obstacles aux déplacements des passagers à mobilité réduite aussi bien à bord des traversiers que dans les installations terminales.

Les deux traversiers ainsi que les gares ont donc été inspectés. Les règles de sécurité, pratiques recommandées et méthodes d'exploitation ont été examinées et les données concernant les dispositifs élévateurs réalisables ont été recueillies. Des critères de conception ont pu alors être dégagés, en tenant compte des facteurs suivants :

- sécurité, y compris les normes et recommandations applicables aux appareils élévateurs;
- dimensions et capacité;
- fiabilité et facilité d'entretien;
- environnement;
- intégration au traversier et stabilité;
- ergonomie;
- exigences de la Garde côtière canadienne;
- rentabilité.

Trois systèmes élévateurs ont été considérés en tenant compte des critères énumérés ci-dessus : un ascenseur et une plate-forme élévatrice pour fauteuils roulants de bord, un ascenseur de quai et une rampe de quai.

Dans la première solution proposée, une plate-forme élévatrice pour fauteuils roulants transporterait les personnes handicapées du pont des véhicules au pont intermédiaire, d'où elles pourraient passer au pont promenade et au pont de passerelle grâce à un ascenseur électrique à câbles ou un ascenseur hydraulique. Il ne serait probablement pas nécessaire d'affecter des préposés à ce service, la fréquence d'utilisation ne le justifierait pas.

Dans le deuxième cas, il s'agirait d'un ascenseur installé sur le quai et donnant accès directement au pont promenade. Il faudrait prévoir entre l'ascenseur et le pont du traversier une rampe dont le plan d'inclinaison serait réglable en fonction des variations de niveau attribuables à la marée comme à la charge du traversier (environ 3,5 m). Il faudrait dans ce cas du personnel pour s'occuper de l'embarquement et du débarquement des véhicules des personnes handicapées.

Quant à la rampe de quai, elle donnerait accès elle aussi directement au pont promenade. Il faudrait, comme dans le cas précédent, que l'inclinaison de la rampe soit réglable. Il faudrait aussi du personnel pour s'occuper des véhicules des passagers handicapés.

Les trois solutions présentées ont été évaluées en fonction des facteurs coût, facilité de construction et d'exploitation, sécurité et commodité pour les usagers. Il a été reconnu que le système ascenseur/monte-fauteuils de bord répondrait le mieux à ces critères.

Le système de bord permet en effet tous les déplacements entre ponts des personnes en fauteuil roulant comme des autres personnes à mobilité réduite, et satisfait donc aux exigences du gouvernement fédéral en matière d'accessibilité des transports.

Une fois le choix du système arrêté, un plan de réalisation a été élaboré, prévoyant l'étude détaillée, la conception, la construction, l'installation et l'évaluation.

Les coûts de conception, de construction et d'installation pour les deux traversiers sont estimés à 350 000 $, et la durée prévue des travaux est d'environ 9 mois. Il est recommandé que l'évaluation, qui devra comprendre la présentation de rapports, soit commencée et terminée dans la même saison. Le coût de l'évaluation est estimé à 29 000 $.

A part le problème des déplacements entre ponts, cette étude a révélé plusieurs autres obstacles majeurs aux déplacements des personnes âgées ou handicapées à bord des traversiers, notamment l'absence de toilettes spécialement aménagées, la présence de surbaux dans les baies de portes, la difficulté d'accès aux comptoirs et aux tables dans la cafétéria et la disposition étroite et raide des escaliers reliant les ponts.

Aucun obstacle majeur aux déplacements des personnes âgées et des handicapés n'a été constaté dans les gares. Les portes d'entrée sont toutefois très lourdes et difficiles à ouvrir. L'accès à certains services, comme la cafétéria, laisse aussi à désirer, en particulier à la gare de Wood Islands.

Les grandes conclusions de cette étude sont que les personnes à mobilité réduite, en particulier celles qui sont confinées à un fauteuil roulant, n'ont aucun moyen facile de se déplacer entre les ponts des traversiers. On constate de plus divers autres obstacles au déplacement de cette catégorie de passagers, aussi bien sur les traversiers que dans les installations terminales.

Par conséquent, il est recommandé que les deux traversiers soient dotés d'un système ascenseur/monte-fauteuils.

Il est également recommandé que les autres obstacles à l'accessibilité sur les traversiers soient supprimés, notamment en ce qui concerne les toilettes, la cafétéria, les surbaux et les escaliers.

Quant aux gares, il est recommandé de rendre les portes d'entrée plus faciles à ouvrir, de prévoir plus d'espace pour la circulation des fauteuils roulants dans la cafétéria, de prévoir des rampes ou des plates-formes élévatrices pour permettre l'accès des fauteuils roulants à la boutique et à la cafétéria de la gare de Wood Islands.

TABLE OF CONTENTS

		PAGE
1.0	INTRODUCTION	1
	1.1 BACKGROUND	1
	1.2 OBJECTIVES	1
	1.3 SCOPE	1
2.0	SURVEY OF VESSELS AND TERMINALS	2
	2.1 NORTHUMBERLAND SERVICE	2
	2.1.1 Ferries - Prince Nova and Prince Edward	2
	2.1.2 Terminals - Caribou Terminal and Wood Islands	12
	2.1.3 Arrival and Boarding	12
	2.1.4 Barriers to the Elderly/Disabled	24
	2.1.4.1 Ferries	24
	2.1.4.2 Terminals	27
	2.2 MARINE ATLANTIC SERVICES	29
	2.2.1 Ferries	29
	2.2.2 Terminal	30
3.0	CURRENT TECHNOLOGY	34
4.0	GOVERNING STANDARDS/REGULATIONS/POLICIES	35
	4.1 CANADA SHIPPING ACT	35
	4.2 CANADIAN STANDARDS ASSOCIATION STANDARDS	35
	4.3 BARRIER FREE DESIGN STANDARDS FOR FERRY SERVICES	35
5.0	ACCESSIBILITY RECOMMENDATIONS	36
	5.1 FERRIES	36
	5.1.1 Level Change for the Disabled	36
	5.1.2 Stairways	36
	5.1.3 Promenade Deck	36
	5.2 ACCESS TO SHIP/BOARDING	37
	5.3 TERMINAL FACILITIES	37
6.0	DESIGN REQUIREMENTS OF A LEVEL CHANGE SYSTEM	41
	6.1 SAFETY CONSIDERATIONS	41
	6.1.1 General Safety Considerations	41
	6.1.2 Standards and Guidelines	42
	6.2 TECHNICAL CONSIDERATIONS	42
	6.2.1 Capacity/Vertical Displacement	42
	6.2.2 Reliability/Maintainability	42
	6.2.3 Environmental Factors	42
	6.2.4 Vessel Interface	43
	6.3 ECONOMICS	43
	6.4 PASSENGER CONSIDERATIONS	43
	6.4.1 Ergonomics/Human Factors	43
7.0	TECHNICAL SPECIFICATIONS	45
	7.1 ELEVATOR TECHNICAL SPECIFICATIONS	45
	7.1.1 Signage & Controls	45
	7.1.2 Lift Parameters	45
	7.1.3 Interior Considerations	46
	7.1.4 Entrance/Exit	46
	7.1.5 Safety Considerations	47
	7.1.6 Environmental	47

TABLE OF CONTENTS (CONT'D)

7.2 WHEELCHAIR LIFT SPECIFICATIONS 47
7.3 RAMP SPECIFICATIONS 48

8.0 PRELIMINARY CONCEPTS 49
8.1 SHIPBOARD ELEVATOR AND WHEELCHAIR LIFT 49
8.2 DOCKSIDE ELEVATOR 52
8.3 DOCKSIDE RAMP 54

9.0 EVALUATION CRITERIA FOR CONCEPT SELECTION 56
9.1 COSTS 56
9.2 SHIP INTEGRATION/IMPACTS 56
9.3 OPERATIONAL CONSIDERATIONS 56
9.4 SUITABILITY FOR DISABLED USERS/ATTENDANT 56
9.5 SAFETY CONSIDERATIONS 57

10.0 CONCEPT SELECTION/DOCUMENTATION 58
10.1 EVALUATION OF CONCEPTS 58
10.1.1 General 58
10.1.2 Cost 58
10.1.3 Ship Integration/Impacts 60
10.1.4 Operational Considerations 60
10.1.5 Suitability for Disabled Users/Attendants 60
10.1.6 Safety Considerations 62
10.2 CONCEPT SELECTION 62
10.3 CONCEPT DOCUMENTATION 63
10.3.1 General 63
10.3.2 Elevator 63
10.3.3 Wheelchair Lift 64
10.3.4 Electrical 64
10.3.5 Installation 64
10.3.6 Operation & Signage 65

11.0 FOLLOW ON PLAN 66
11.1 FEASIBILITY 66
11.2 PLAN FOR PHASE II - DETAILED DESIGN/CONSTRUCTION, AND PHASE III EVALUATION OF THE SYSTEMS INSTALLED 66
11.3 APPROACH/METHODOLOGY 66
11.3.1 Phase II - Detailed Design/Construction 66
11.3.2 Phase III - Evaluation 68
11.4 WORK PLAN/SCHEDULE 69
11.5 PROJECT TEAM 71
11.6 COSTS 71

12.0 CONCLUSIONS AND RECOMMENDATIONS 72
12.1 CONCLUSIONS 72
12.2 RECOMMENDATIONS 72

TABLE OF CONTENTS (CONT'D)

APPENDICES

APPENDIX

A	PRINCE NOVA/EDWARD GENERAL ARRANGEMENT
B	SITE PLANS OF CARIBOU AND WOOD ISLANDS TERMINALS
C	LEVEL CHANGE SYSTEM INFORMATION
D	CANADA SHIPPING ACT SHIPS' ELEVATOR REGULATIONS
E	DRAFT - "BARRIER FREE DESIGN STANDARDS FOR FERRY SERVICES" MARINE POLICIES AND PROGRAMS
F	WHEELCHAIR LIFT SPECIFICATIONS TAKEN FROM CSA B355-M86

LIST OF FIGURES

FIGURE

2.1	VIEW OF CASING THAT ENCLOSED THE STAIRWAYS	4
2.2	CAR LANE ABOARD THE VESSELS	5
2.3	VIEW SHOWING TIGHT VEHICLE SPACING	6
2.4	STAIRWAY INSIDE CASING	7
2.5	CORRIDOR AND WASHROOM ENTRANCE ABOARD THE PRINCE NOVA	8
2.6	CAFETERIA LINE AND SEATING ABOARD THE PRINCE EDWARD	9
2.7	LOUNGE ABOARD THE PRINCE EDWARD	10
2.8	OUTSIDE OBSERVATION DECK ABOARD THE PRINCE NOVA	11
2.9	CARIBOU TERMINAL - TOLL BOOTH	13
2.10	CARIBOU TERMINAL - VEHICLE WAITING AREA AND FACILITIES BUILDING	14
2.11	CARIBOU TERMINAL - RAMP TO FERRY	15
2.12	CARIBOU TERMINAL - VIEW FROM RAMP SHOWING FACILITIES AND VEHICLE WAITING AREA	16
2.13	CARIBOU TERMINAL - WHEELCHAIR ACCESS TO FACILITIES BUILDING	17
2.14	CARIBOU TERMINAL - CAFETERIA TABLES	18
2.15	VIEW SHOWING DISTANCE BETWEEN GIFT SHOP/CAFETERIA AND MAIN TERMINAL - WOOD ISLANDS TERMINAL	19
2.16	WOOD ISLANDS TERMINAL - PASSENGER LOUNGE	20
2.17	GIFT SHOP/CAFETERIA - WOOD ISLANDS TERMINAL	21
2.18	GIFT SHOP STAIRS - WOOD ISLANDS TERMINAL	22
2.19	WOOD ISLANDS TERMINAL - RAMP TO FERRY	23
2.20	SHIP STAIRS - MEZZANINE DECK TO PROMENADE DECK	25
2.21	DOOR SILLS ON PROMENADE DECK	26
2.22	CAFETERIA TABLES ABOARD THE PRINCE EDWARD	28
5.1	TELEPHONE HEIGHT AT CARIBOU TERMINAL	38
5.2	CAFETERIA LINE AT CARIBOU TERMINAL	40
8.1	ELEVATOR IN AFT LOCATION	50
8.2	ELEVATOR IN FORWARD LOCATION	51
8.3	DOCKSIDE ELEVATOR CONCEPT	53
8.4	DOCKSIDE RAMP	55

TABLE OF CONTENTS (CONT'D)

FIGURES

11.1	PROJECT SCHEDULE - PHASE II - DETAILED DESIGN/CONSTRUCTION	70
11.2	PROJECT SCHEDULE - PHASE III - EVALUATION	70

LIST OF TABLES

TABLE

2.1	PRINCE NOVA/EDWARD - VESSEL INFORMATION	3
2.2	ABEGWEIT - VESSEL INFORMATION	31
2.3	HOLIDAY ISLAND/VACATIONLAND - VESSEL INFORMATION	32
2.4	JOHN HAMILTON GRAY - VESSEL INFORMATION	33
10.1	BUDGETARY COSTS AND FACTORS AFFECTING COSTS FOR THREE LEVEL CHANGE CONCEPTS (PER SYSTEM)	59
10.2	SUITABILITY CONSIDERATIONS FOR DISABLED - FOR THREE SYSTEMS ANALYZED	61
11.1	SCHEDULE SUMMARY	69

1.0 INTRODUCTION

1.1 BACKGROUND

This project was conducted by W.R. Davis Engineering Limited (DAVIS) in conjunction with German & Milne Inc. and Humantech Inc. under a contract with the Transportation Development Centre (TDC) in response to the needs of the Marine Policy and Programs Group of Transport Canada to investigate accessibility problems and propose solutions to provide barrier-free accessibility for elderly and disabled passengers on federally subsidized ferry services.

For the most part new vessels have been built to barrier-free standards and some vessels have been retrofitted. However two of the older federally subsidized vessels - the Prince Nova and the Prince Edward, do not have an acceptable level change system for between deck transfers of disabled persons.

At present all passengers board the ferry on the Main (Vehicle) Deck. There is no convenient method for physically disabled passengers to move from the Main Deck up to the Promenade Deck where passengers remain for the duration of the trip. It is expected that these vessels will be in service for the next 10 to 14 years. In addition there are also other areas that hinder accessibility for disabled passengers aboard the vessels and at the terminals which serve the ships.

1.2 OBJECTIVES

The objectives of this project are as follows:

- develop concepts for a level change system for boarding and between deck transfer of physically disabled passengers on the two vessels.
- evaluate barriers to accessibility for disabled passengers on the Prince Nova and Prince Edward vessels,
- evaluate barriers to accessibility for disabled passengers with regard to the terminals from which the vessels sail,

1.3 SCOPE

This project involved the development of concepts for a level change system for boarding and between deck transfers of disabled passengers. In addition other barriers to accessibility on the vessels and at the terminals were identified and recommendations made.

2.0 SURVEY OF VESSELS AND TERMINALS

Two site visits were made to examine the ferries and terminals. The first visit was made on April 6, 1989 prior to initiation of the 1989 sailing season for the Northumberland Ferry Service. The Prince Edward Ferry and the Caribou Terminal were examined. The Prince Edward was in dry dock in Pictou, Nova Scotia and was undergoing repairs and preparations for the start of the season which was to start in early May. The Caribou Terminal was also being repaired and prepared for the 1989 season.

The second site visit was made on May 11 and 12, 1989 while the vessels were in operation. Both the Prince Edward and Prince Nova Ferries were examined as well as the Caribou and Wood Islands Terminals. In addition, the Marine Atlantic Service which runs between Borden, P.E.I. and Cape Tormentine, New Brunswick was also visited. The Borden terminal and the following vessels were examined; the Abegweit, Holiday Island, John Hamilton Gray and Vacationland.

2.1 NORTHUMBERLAND SERVICE

The following subsections provide a summary of the findings of the site visits made to the Northumberland Ferry Service including a description of the vessels and terminals, boarding procedures and barriers to the elderly and disabled. The service runs between Caribou, Nova Scotia and Wood Islands, P.E.I. from May to December. The approximate crossing time is one hour and fifteen minutes.

2.1.1 Ferries - Prince Nova and Prince Edward

The Prince Nova and Prince Edward are sister ships and are essentially similar except for minor differences resulting from regulation changes that came into effect during the time that the two vessels were built. The Prince Nova is 26 years old, and the Prince Edward, 16 years old. General arrangement drawings of the vessels are included in Appendix A and vessel information is included in Table 2.1. Vehicles are boarded on the main deck of the vessel which is divided into three sections. The sections are separated by two casings which contain all interfaces between the lower and upper decks. The casings are relatively narrow being only 90 cm (36 in) wide and they house the four stairways which lead to the upper decks, (Figure 2.1). The outside lanes of the main deck are for cars only due to the lower ceiling height, (Figure 2.2). These two lanes are 258 cm (101 in) wide and with a car parked in the lane, the doors of a vehicle cannot generally be fully opened. The three centre lanes are generally used for large trucks. With the three trucks parked side by side, spacing can range from 10 cm (4 in) between the casing and vehicle to 61 cm (24 in) between vehicles, (Figure 2.3). The ferry staff adjust the positioning of vehicles to optimize space and weight distribution, and inevitable there is very little room between vehicles and passageways are obstructed. The vehicle deck is generally loaded to capacity with very little free space remaining when loaded. To get to the Promenade Deck where the passengers remain for the duration of the trip, two sets of very steep stairs must be climbed, (Figure 2.4). On the Promenade Deck are found the washroom facilities, a cafeteria, a lounge and an outside observation deck (Figure 2.5 to 2.8).

	PRINCE NOVA	PRINCE EDWARD
Year Built	1964	1972
Overall Length (m)	75.9	75.9
Breadth (m)	16.3	16.3
Displacement Tonnage (Tonnes)	1799	1754
Power, horsepower	3200	3200
Service Speed (knots)	12.5	12.5
Elevators	N/A	N/A
Passenger Capacity	300	300
Automobile Capacity	60	60
Tractor Trailer Capacity (16.7 m units)	7	7

TABLE 2.1 PRINCE NOVA/EDWARD - VESSEL INFORMATION

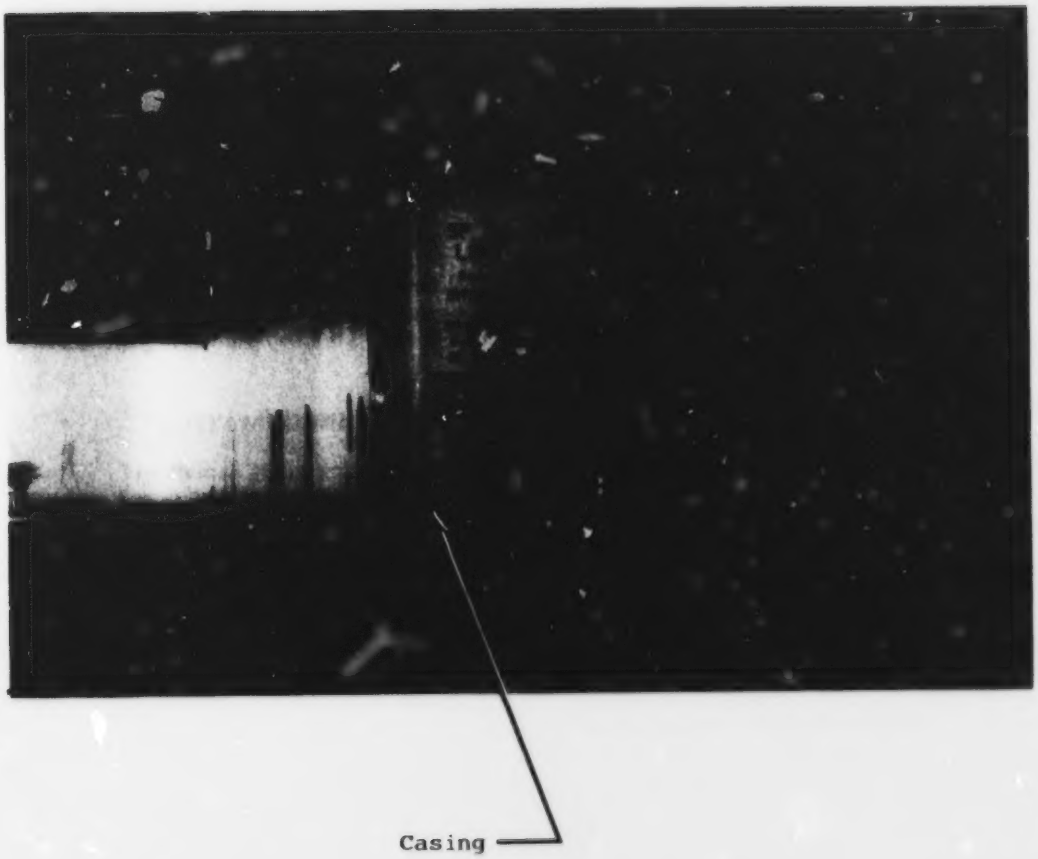
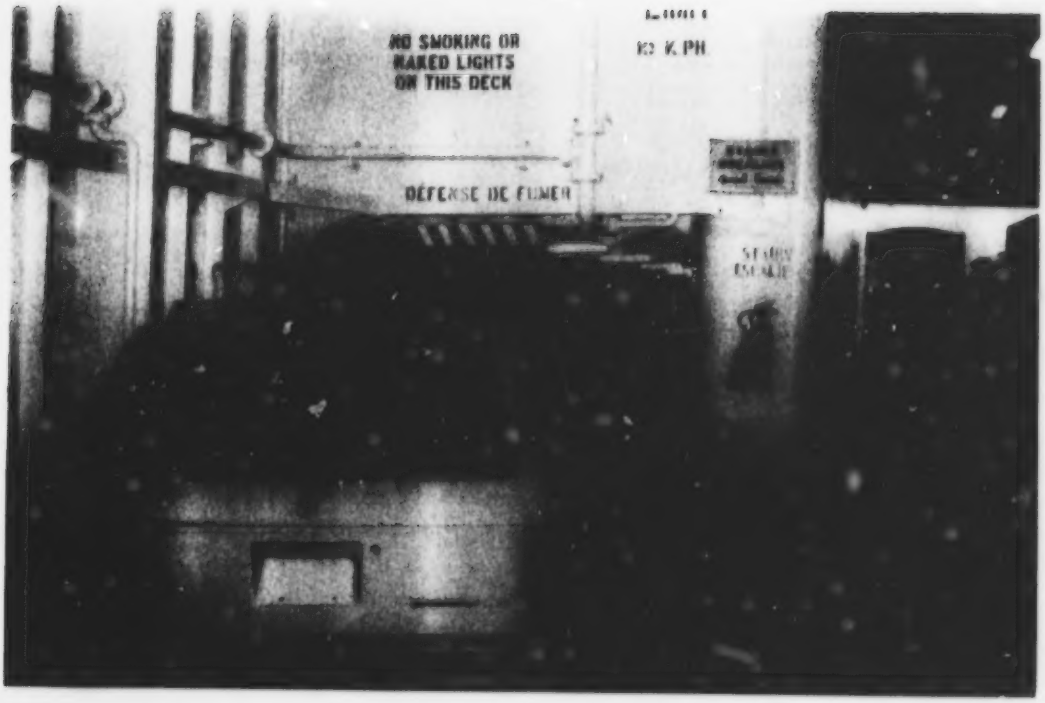


FIGURE 2.1 VIEW OF CASING THAT ENCLOSED THE STAIRWAYS



Note: Naked Lights means open Flames or Sparks

FIGURE 2.2 CAR LANE ABOARD THE VESSELS

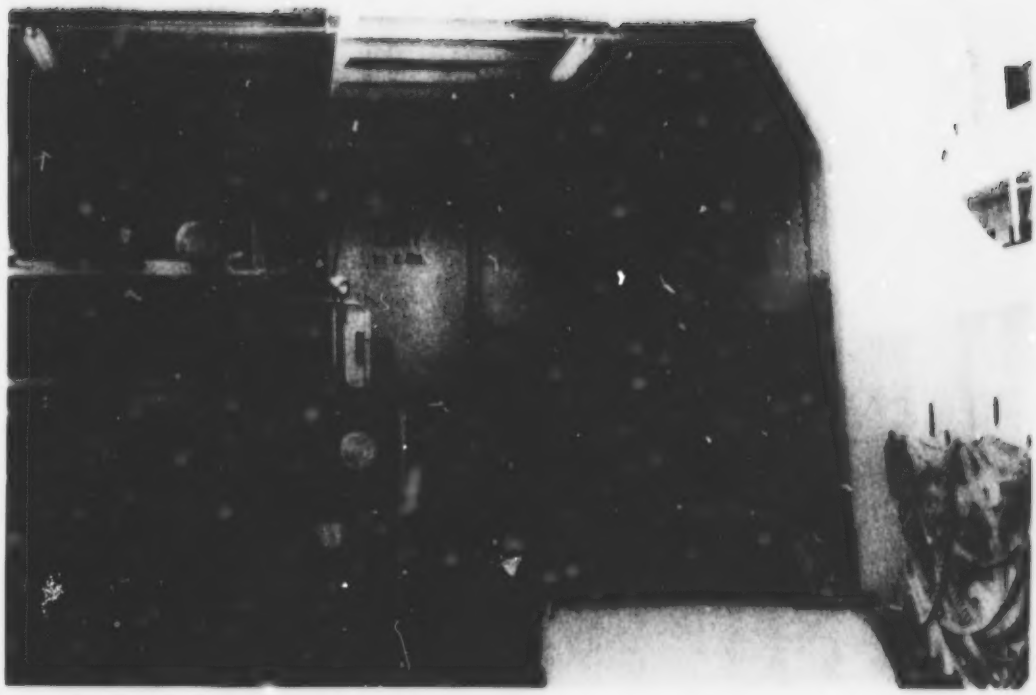


FIGURE 2.3 VIEW SHOWING TIGHT VEHICLE SPACING

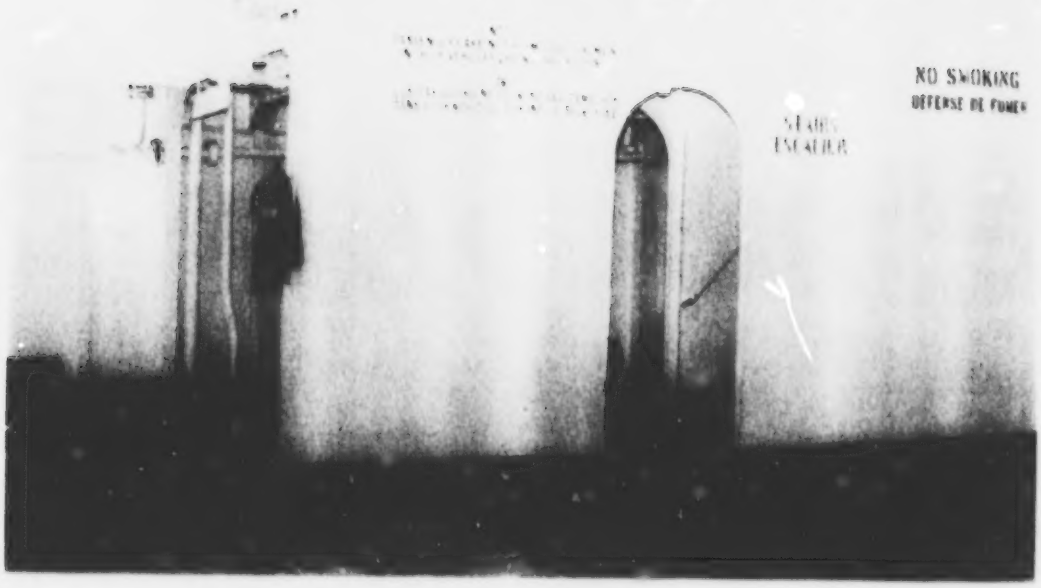


FIGURE 2.4 STAIRWAY INSIDE CASING

FIGURE 2.5 CORRIDOR AND WASHROOM ENTRANCE ABOARD THE PRINCE NOVA

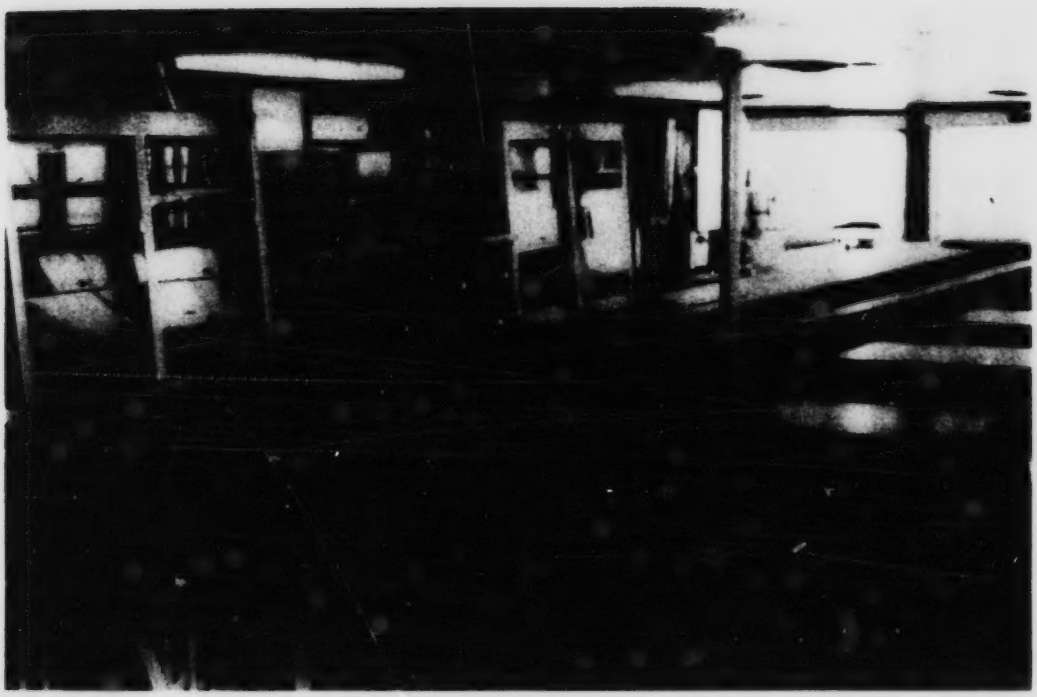


FIGURE 2.6 CAFETERIA LINE AND SEATING ABOARD THE PRINCE EDWARD

FIGURE 2.7 LOUNGE ABOARD THE PRINCE EDWARD

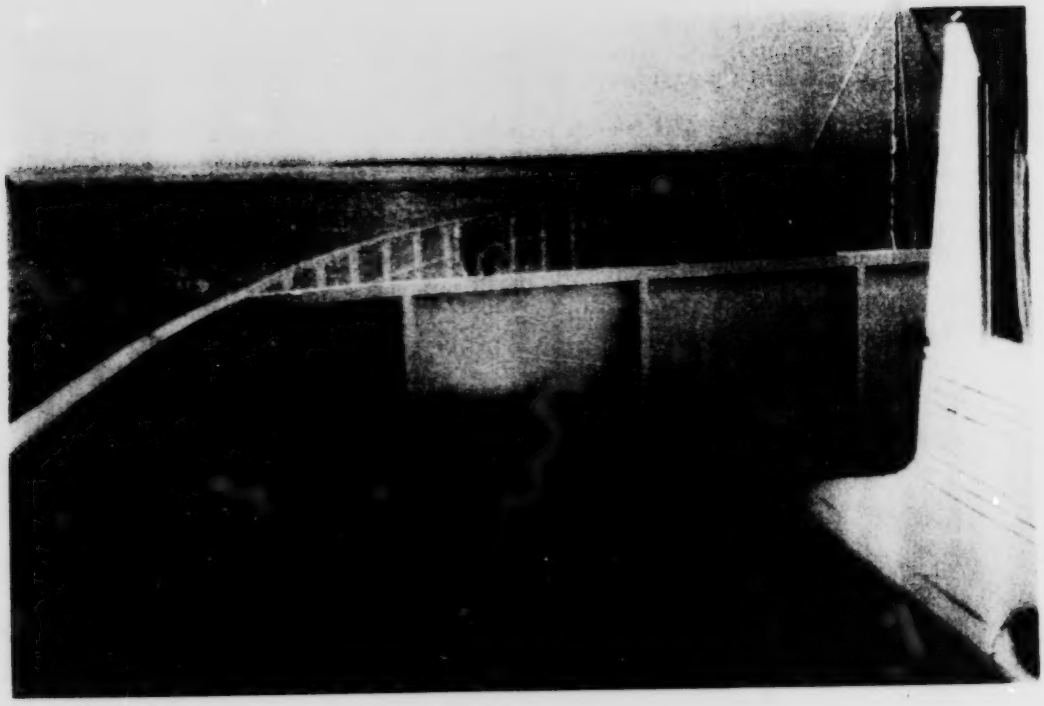


FIGURE 2.8 OUTSIDE OBSERVATION DECK ABOARD THE PRINCE NOVA

2.1.2 Terminals - Caribou Terminal and Wood Islands

The two terminals where the ferries arrive and depart from are the Wood Islands Terminal in Prince Edward Island and the Caribou Terminal in Nova Scotia. Site plans for the terminals are included in Appendix B. Each terminal includes a toll booth, vehicle waiting area, access road to and from the ferry, adjustable access ramps at the ferry docking stations (2), passenger lounge, cafeteria and gift shop.

The terminals are designed primarily for accommodating a large quantity of vehicular traffic including tractor trailers.

Each terminal includes both a departure and an arrivals side. At the Caribou terminal all facilities are contained in one building on the departure side. No facilities are included on the arrivals side but the facilities on the departure side are easily accessed. Figures 2.9 to 2.14 show views of various portions of the Caribou Terminal.

The facilities at the Wood Islands terminal are included on both the departure and arrivals side. A passenger lounge with washroom facilities, telephones and vending machines is included on the departure side beside the vehicle waiting area.

The cafeteria, gift shop and information centre are included in two buildings on the arrival side of the terminal. One building houses the cafeteria and gift shop which are each located on a separate floor. The tourist information centre is located in the other building. The site plan in Appendix B shows the location of the buildings.

Figures 2.15 to 2.19 show views of various portions of the Wood Islands terminals.

The facilities at both of the terminals are generally accessible for the disabled person since they were built to government standards for wheelchair accessibility. Some problem areas exist however as discussed in Section 2.1.4.

2.1.3 Arrival and Boarding

All vehicles enter the terminal at the toll booth where the fare for the crossing is paid. Passengers with special requirements (i.e. disabilities) notify the ticket attendant upon arrival. No advance reservations are accepted although information is given regarding level of service and best times for crossing when passengers call ahead of time. They are then directed into a special line in the waiting area where they are accommodated according to their needs. Their vehicles are also identified with a sign which is placed on the windshield so that the boarding personnel can provide the assistance necessary. Separate areas are provided for both trucks and cars. While waiting the passengers can leave their vehicles and take advantage of the passenger lounge, cafeteria and/or gift shop.

Once the ferry arrives and docks all vehicles onboard are driven off. The vehicles in the terminal are then directed to the ferry in an organized fashion. Vehicles that are identified as having passengers requiring special assistance are directed into the line at the appropriate time so the vehicle will be located at the appropriate area aboard the vessel (i.e. out of the way of regular traffic flow and near a staircase).

FIGURE 2.9 CARIBOU TERMINAL - TOLL BOOTH

FIGURE 2.10 CARIBOU TERMINAL - VEHICLE WAITING AREA AND FACILITIES BUILDING

FIGURE 2.11 CARIBOU TERMINAL - RAMP TO FERRY

FIGURE 2.12 CARIBOU TERMINAL - VIEW FROM RAMP SHOWING FACILITIES AND VEHICLE WAITING AREA

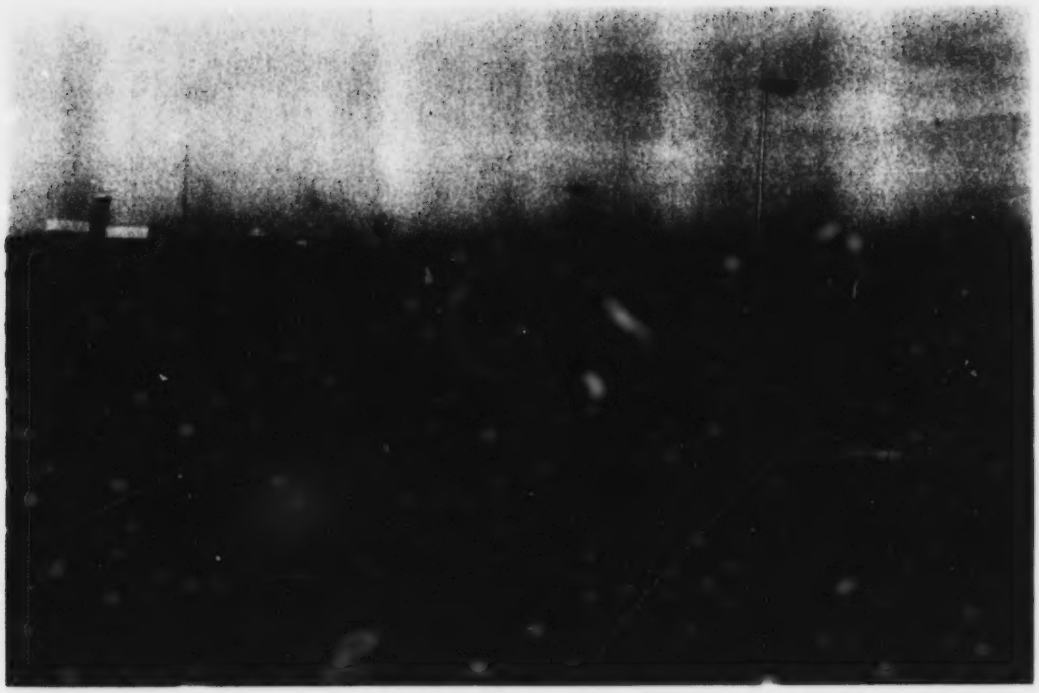


FIGURE 2.13 CARIBOU TERMINAL - WHEELCHAIR ACCESS TO FACILITIES BUILDING

FIGURE 2.14 CARIBOU TERMINAL - CAFETERIA TABLES

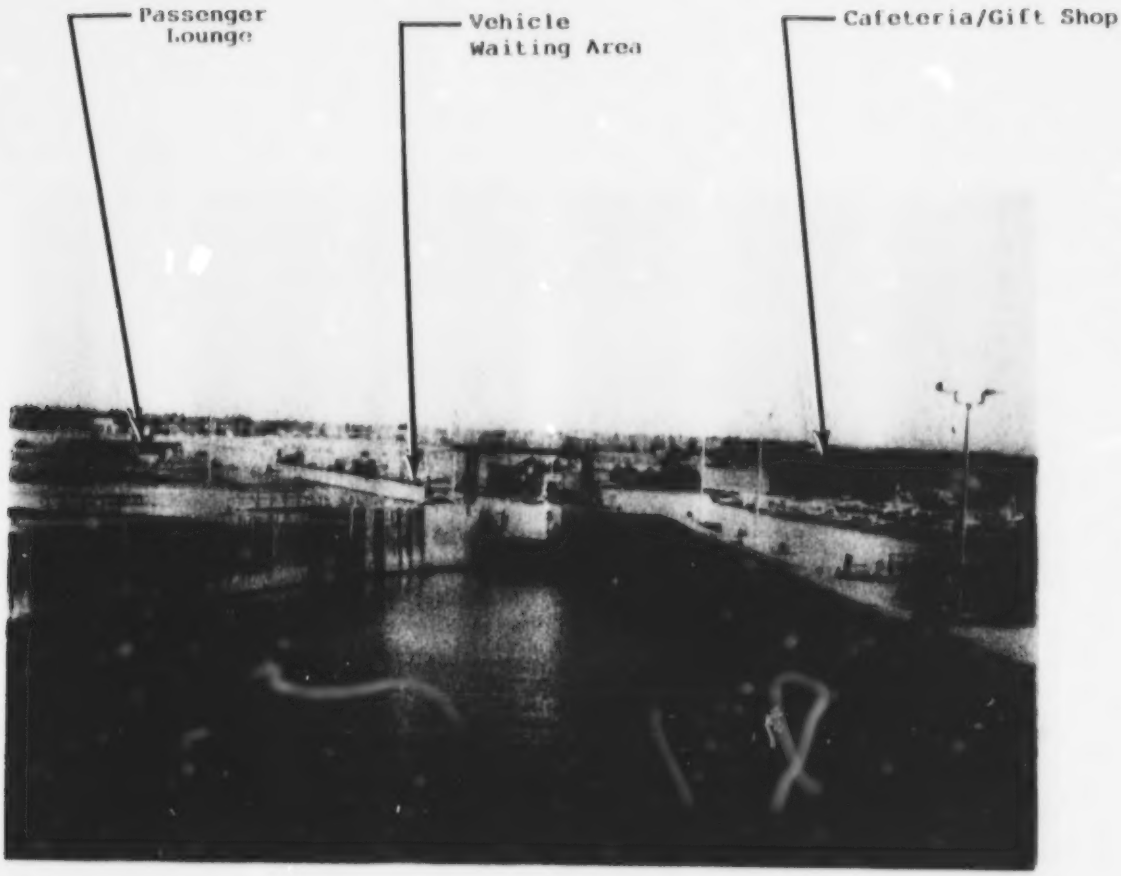


FIGURE 2.15 VIEW SHOWING DISTANCE BETWEEN GIFT SHOP/CAFETERIA AND MAIN TERMINAL - WOOD ISLANDS TERMINAL

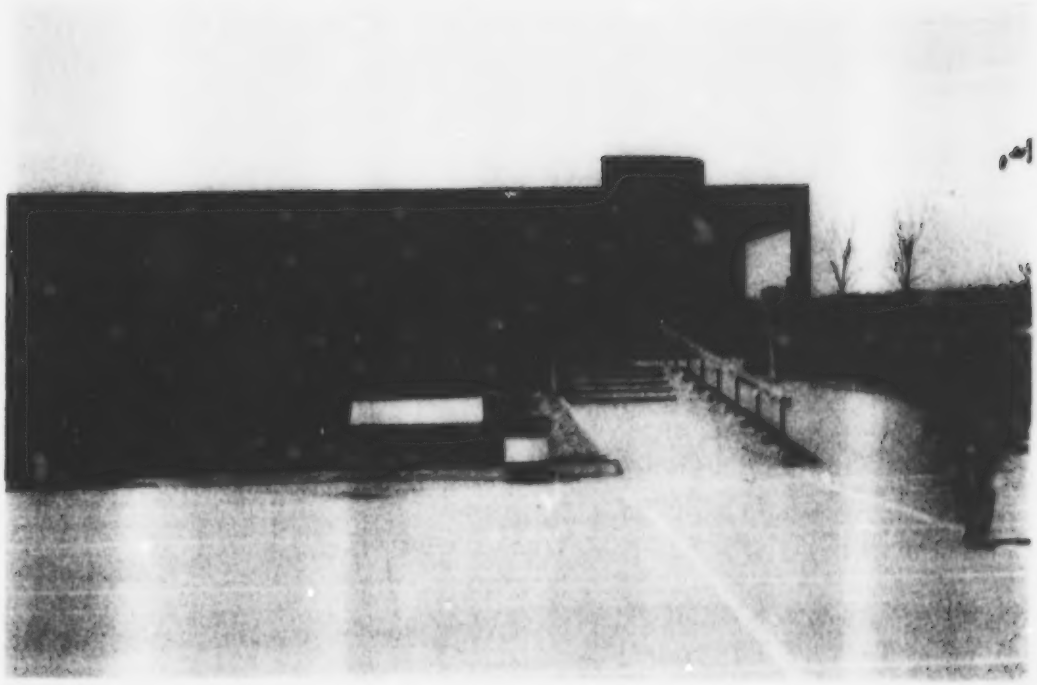


FIGURE 2.16 WOOD ISLANDS TERMINAL - PASSENGER LOUNGE

FIGURE 2.17 GIFT SHOP/CAFETERIA - WOOD ISLANDS TERMINAL

FIGURE 2.18 GIFT SHOP STAIRS - WOOD ISLANDS TERMINAL

FIGURE 2.19 WOOD ISLANDS TERMINAL - RAMP TO FERRY

All vehicles board the ship by a ramp to the main deck where they are directed where to park by ferry personnel. Passengers are then requested to proceed to the Promenade Deck. To reach the Promenade Deck one must climb two sets of steep narrow stairways located in the casings of the ship. Passengers who board the ferries without a vehicle also board by the ramp to the main deck and use stairways to get to the Promenade Deck. Although there are no regulations preventing passengers from remaining on the main deck during crossing, this practice is discouraged for safety reasons.

The specially identified vehicles are directed to a location near the stairs where there is sufficient room to fully open vehicle doors. If that person is unable to negotiate the stairs by themselves then they are either allowed to remain in their vehicles during the trip or assisted by an attendant(s) up the stairs to the Promenade Deck.

2.1.4 Barriers to the Elderly/Disabled

The following subsections describe the areas that may restrict accessibility to the elderly/disabled passengers aboard the vessels and at the terminals.

2.1.4.1 Ferries

The major accessibility problems are confronted when a passenger boards the vessels. The most significant is the lack of a convenient method of transferring between decks. Many disabled or elderly passengers find it difficult or impossible to use the stairways to the Promenade Deck from the Main Deck, (Figure 2.20). The access at the entrance to the stairs is narrow, 76 cm (30 in) wide, and the stairs are steep having a slope of more than 45°. The railings on the stairways are narrowly spaced ranging from 53 cm (21 in) to 69 cm (27 in) apart. There are no specific requirements for the slope and width of stairways, however, if they were made wider and less steep accessibility would be greatly improved. The only alternative for a disabled person in a wheelchair is to be carried up the stairs without their wheelchair, since it would not clear the railings. This would be physically demanding on the ferry personnel and potentially hazardous if the stairs were wet or the waters rough. This might also have negative psychological effects on the disabled person since it might be embarrassing and humiliating to be seen having to be carried up the stairs.

Once on the Promenade Deck there are more obstacles which limit a disabled persons accessibility. They are as follows:

- There are no wheelchair accessible washrooms on board the ship, and the layout of the men's washroom in particular has a number of turns which are not negotiable in a wheelchair
- In front of every door leading from the outside deck to the interior of the Promenade Deck is a one inch metal holder for a rubber mat
- The door sills between the outer deck and the enclosed areas on the Promenade Deck have a raised 20 cm (8 in) coaming the purpose of which is to limit flooding between compartments (Figure 2.21)
- Within the Promenade Deck, most doorways have 15 cm (6 in) high coamings

FIGURE 2.20 SHIP STAIRS - MEZZANINE DECK TO PROMENADE DECK

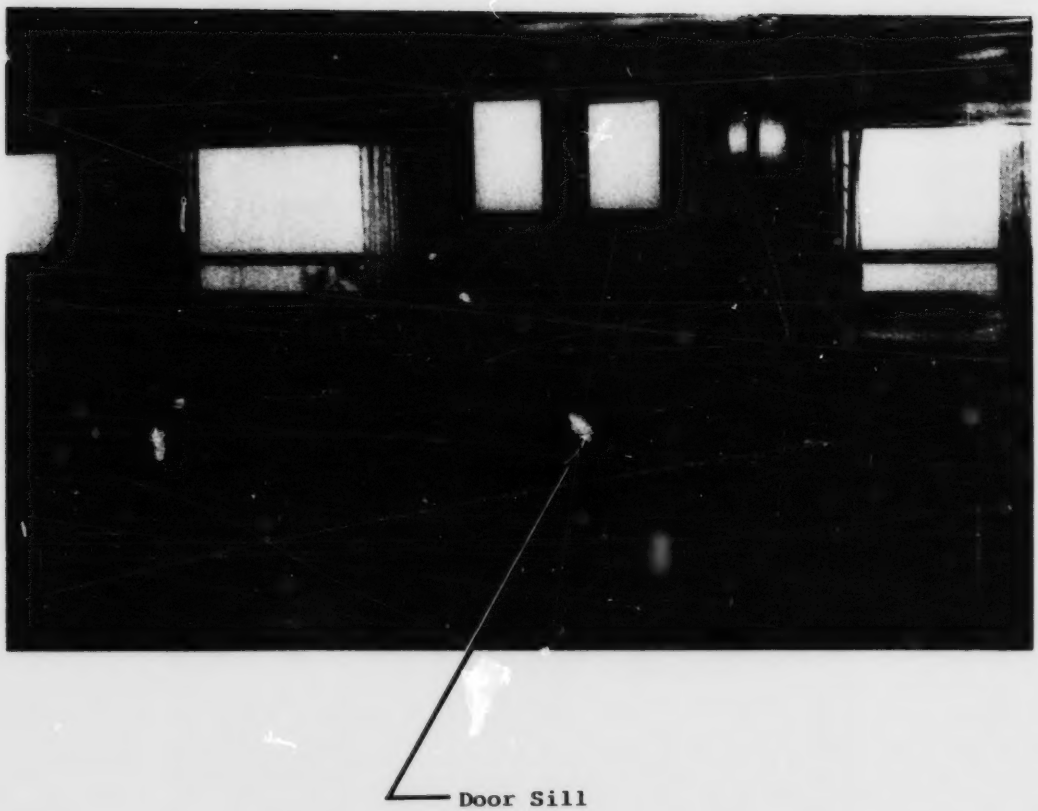


FIGURE 2.21 DOOR SILLS ON PROMENADE DECK

- The cafeteria uses high deep shelves for self-serve foods. The top shelves or the back of the lower shelves cannot be easily reached by wheelchair users. The hot foods counter is also high and cannot be safely reached by wheelchair users

- Cafeteria seats are rigidly attached to the tables and cannot be moved to accommodate a wheelchair (Figure 2.22)

- Access to the bridge deck is also limited due to steep and narrow stairways.

- The seats in the lounge area of the Promenade Deck are low, 46 cm (18 in) high, and can cause difficulty for elderly or disabled persons when raising or lowering themselves.

2.1.4.2 Terminals

Elderly or disabled users of the ferry services generally have no major accessibility barriers in the terminals, however there are some minor obstacles which may be encountered. They are as follows:

Common to both terminals

- The entrance doors to the terminals are heavy and difficult to open from a wheelchair

- Drinking fountains and telephones are generally positioned for wheelchair users, however people who have difficulty bending may have problems using the low facilities

- The layout of the terminals sometimes requires wheelchair users to take a circuitous route compared to the normal traffic flow.

Specific problems found at the Caribou Terminal are:

- The information counter is quite high, 107 cm (42 in) and not easily reached by a wheelchair user

- The newsstand design within the terminal is not well suited for wheelchairs. The sales counter is high and most of the magazine rack and about half the book racks are unreachable from a wheelchair. The dairy freezer and dairy cooler have deep shelves which make the back sections inaccessible

- The cafeteria self-serve shelves for cold foods are high and deep enough that they are not accessible to wheelchair users. The hot food counter is also high

- The cafeteria tables have fixed seating which make it difficult for wheelchair users. Only the ends of the outside tables are accessible (Figure 2.14). The spring loaded seats would also be difficult to use by the mobility impaired since the chair must be held into position against spring tension before sitting down

- There is little room between tables and chairs for walking or moving. Access for wheelchairs is also prohibitive.

FIGURE 2.22 CAFETERIA TABLES ABOARD THE PRINCE EDWARD

The Wood Islands Terminal does have facilities on the departure side which are accessible to the disabled. No cafeteria or gift shop is however available in this building.

The cafeteria/gift shop is located on the arrivals side of the terminal. This building is presently leased and is not a part of the government facilities.
Specific problems that were identified with this facility included the following:

- Passengers are required to go across the traffic lanes when on the departure side of the terminal, (Figure 2.15).
- There is no ramp to provide access to the cafeteria which has four steps at the entrance (Figure 2.17).
- The giftshop is located one level below the cafeteria and the only access provided is a staircase, (Figure 2.18).

It is planned that this facility will be replaced in the near future with accessible facilities, and that the current situation regarding accessibility will be rectified.

In addition to the above access to the ferries is on a first come first served basis. No reservations are accepted. During the peak season the lineup for the ferry can extend for many kilometres before the terminal toll booth. Passengers who have difficulty walking or are restricted to wheelchairs have no access to any facilities and must wait until they arrive at the terminal. There is also limited parking space for passengers leaving their vehicles at the terminal and proceeding as pedestrians on the ferry. Plans are currently being considered that will provide a passenger drop off at the ferry dock and provide expanded parking facilities.

2.2 MARINE ATLANTIC SERVICES

In order to gain a better understanding of the problems and to assist in arriving at potential solutions for the level change system another ferry service that operates between Prince Edward Island and the mainland was examined. The service is operated by Marine Atlantic (formerly CN Marine) and runs between Borden, P.E.I. and Cape Tormentine, New Brunswick. This service provides year round access to P.E.I. Crossing time is approximately 45 minutes. The Marine Atlantic Network operates six vehicle ferry services linking the provinces of Atlantic Canada and the state of Maine U.S.A.

Four vessels and one terminal were examined.

The following gives a brief summary of the findings of the visit to the Marine Atlantic Services.

2.2.1 Ferries

The following describes the vessels that were examined:

Abegweit:

This vessel was the newest, best equipped and largest of all the vessels surveyed. The lower deck accommodates all vehicle types including railcars. The upper deck is

divided into two levels and the top level can be raised to provide clearance for trucks. This vessel has a large centre casing that contains the stairways, escalators and elevator. Each side of the casing has enough room for three lanes of cars or two lanes of trucks.

The passenger deck has washroom facilities for the handicapped, ramps at all doorways, plenty of clearance and space for wheelchair mobility and cafeteria tables for wheelchair use. Also included are audible and visual alarms and signs for the hearing and visually impaired.

Information on the Vessel is contained in Table 2.2.

Holiday Island and Vacationland:

These two vessels are sister ships, both approximately 18 years old, which have been retrofitted with facilities for the physically disabled. The vessels are equipped with two vehicle decks and each deck is divided into two sides by a centre casing. At the forward end of the casing, a cable hoisted elevator has been installed to give access to all three levels on board. A washroom, small but adequate, is provided for wheelchair passengers. Other retrofits include ramps at doorways, and audible and visual alarms in every room. The cafeteria accessibility was adequate but narrow and there were no tables to accommodate wheelchairs.

Vessel information is contained in Table 2.3.

John Hamilton Gray:

This is an older vessel which has two levels for vehicles including railcars. It is equipped with an elevator which only serves the two vehicle decks. From the upper vehicle deck level disabled passengers are taken up a short ramp to an escalator where the assistance of ferry personnel is required to move up to the passenger deck. The vessel has been retrofitted with wheelchair accessible washrooms, audible and visual alarms, signs and door ramps to increase accessibility.

Vessel information is included in Table 2.4.

2.2.2 Terminal

The Borden Terminal was the only terminal examined at the Marine Atlantic Services. Accessibility is generally good at this terminal with a gentle sloping ramp at the entrance, spacious cafeteria and waiting lounge, and accessible washroom facilities. Signs are also posted which instruct passengers how to get assistance for those who need it.

In general it was found that the four vessels and the terminal examined in the Marine Atlantic Services provided good accessibility for disabled passengers.

Year Built	1982		
Overall Length	122	(m)	400 (ft)
Beam	21	(m)	69 (ft)
Gross Tonnage	12,232	(tonnes)	13390 (tons)
Power	13,430	(kW)	18,000 (HP)
Maximum Speed	33.4	(km/hr)	18 (knots)
Passenger Capacity	974		
Auto Capacity	250		
Life saving Equipment	two lifeboats, twenty-four life rafts, Total capacity 1008		
Elevators	1 - Passenger		
Tractor Trailer Capacity (16.7 m (55 ft) units)	40		

TABLE 2.2 ABEGWEIT - VESSEL INFORMATION

Length	99.06 m	(325')
Breadth	20.9 m	(68'7")
Loaded Draft	5.05 m	(16'7")
Gross Tonnage	2775 Tonnes	(3037 Tons)
Displacement Tonnage	3627 Tonnes	(3998 Tons)
Two Bow Doors	3.2 x 4.72 m	(10'6" x 15'6")
Two Stern Doors	3.2 x 4.72 m	(10'6" x 15'6")
Main Engines:		
Two Ruston Diesels	V-16	V-16
Four stroke	2704 kW	3625 HP ea
Total HP:	5408 kW	7250 HP
Maximum Speed:	31.5 km/hr	17 knots
Service Speed:	27.8 km/hr	15 knots
Propulsion: Voith-Schneider, Twin Screw, Variable Pitch		
Electrical System:		
Two Paxman Diesel alternator sets 480 volts 60 HZ	716 kW	960 HP
Lifesaving Equipment:		
Two motor life boats, sixteen liferafts Total capacity	520	520
Fire Protection:		
Fire and smoke detectors throughout the ship manual CO^2 Extinguishing systems in critical areas		
Elevators: 1 (for the handicapped)		
Passenger Capacity:	485	485
Automobile Capacity:	155	155
Tractor Trailer Capacity:	16 (16.8 m units)	16 (55' units)

TABLE 2.3 HOLIDAY ISLAND/VACATIONLAND - VESSEL INFORMATION

Year Built	1968		
Overall Length	114	(m)	374 (ft)
Beam	20	(m)	66 (ft)
Gross Tonnage	10215	(tonnes)	1118 (tons)
Power	16000	(kW)	16,000 (HP)
Maximum Speed	18	(km/hr)	18 (knots)
Passenger Capacity	516		
Auto Capacity	165		
Tractor Trailer Capacity (16.7 m (54.8 ft)units)	18		
Lifesaving Equipment	four lifeboats & 18 liferafts ~Total Capacity 696		

TABLE 2.4 JOHN HAMILTON GRAY - VESSEL INFORMATION

3.0 CURRENT TECHNOLOGY

The level change systems used on board vessels in the Marine Atlantic Service were examined to gain a better appreciation of the problems associated with incorporating a level change system into the Prince Edward and Prince Nova. Other systems as used in similar or other applications were also identified and assessed.

For the disabled person, the elevator is the preferred method of changing from one elevation to another. In most buildings and ships level change is most often accomplished by elevators since it is usually the most practical method available. Elevators are either hydraulic or cable operated, depending on the application and number of levels to be served. At present the majority of the ferries that provide services on the East Coast have been retrofitted or been built with elevators to provide level change. Elevator construction is of the overhead cable and motor type due to the space limitations on board the ship. Since the environment is a very salty one which promotes corrosion, stainless steel and protective coatings are used extensively.

In cases where a relatively small vertical lift is required, an elevator may be a costly option. In this case an open type vertical wheelchair lift might prove to be the most practical solution. These types of lifts are governed by CSA Standards to elevation changes of less than 2.5 m (8.2 ft) and to providing access between two levels only. There are several types of open type wheelchair lifts available on the market today that provide a cost effective method of small vertical lifts.

When vertical lifts are not a practical solution to elevation changes, other methods have been utilized. Escalators, for example, are presently used on the John Hamilton Gray to provide access between the upper vehicle and passenger decks. Although escalators require the help of attendants to hold a wheelchair in place, they do provide elderly or mobility impaired passengers an easier method of level change than stairs. Other methods include wheel chair platforms which move up stairways by means of a gear drive and wall mounted tracks or the more portable stair walkers which attach to a wheelchair and climb staircases by means of a track drive system.

Information regarding the different systems is included in Appendix C.

4.0 GOVERNING STANDARDS/REGULATIONS/POLICIES

4.1 CANADA SHIPPING ACT

Elevating devices installed on Canadian ships or ships engaged in the coasting trade of Canada must meet the requirements as specified in the Canada Shipping Act. Ships Elevator Regulations (Appendix D). The installation of the device has to be approved by the Canadian Coast Guard Ship Safety Branch in accordance with the regulation as well as the Ship Classification Society. This generally takes 1 to 2 months. The regulation states that the device must comply with CSA Standards. These include:

CAN 3-B44-M85:	Safety Code for Elevators
CAN 3-B44S1-87:	Supplement No. 1 to CAN B-B44-M85
CAN/CSA-B355-M86:	Elevating Devices for the Disabled

Further information on the CSA Standards is included in Section 4.2.

4.2 CANADIAN STANDARDS ASSOCIATION STANDARDS

CAN3-B44-M85 "Safety Code for Elevators" is used to establish minimum requirements for the design, construction, installation, operation, inspection, testing, maintenance, alteration, and repair of elevators, dumbwaiters, escalators, moving walks, freight platform lifts, and their hoistways or wellways, and temporary use of permanent elevators for carrying workmen or materials. Although this standard does not apply specifically to elevating devices for the handicapped it can be used as a general guide for safe design practice.

CAN3-B355-M86 "Elevating Devices for the Handicapped" is referenced from CAN3-B44-M85 and specifies the minimum requirements for the design, construction, installation, operation, inspection and testing of elevating devices that are to be specifically used by handicapped persons. The purpose of the requirement is to safeguard against risk of accidents when operating the devices.

4.3 BARRIER FREE DESIGN STANDARDS FOR FERRY SERVICES

A draft standard produced by Marine Policies and Programs (Appendix E), sets out the guidelines that should be used in order to make a ferry travel barrier free to all disabled persons. This standard deals with all types of barriers which may be encountered and also gives specific guidelines to be followed for disabilities which include a wheelchair user, visually impaired, mobility impaired and hearing impaired people.

5.0 ACCESSIBILITY RECOMMENDATIONS

Based on the barriers to the elderly and disabled that were identified in Section 2.1.4, a number of recommendations can be made that would enhance accessibility while using the ferry system. These are included in the following subsections.

5.1 FERRIES

5.1.1 Level Change for the Disabled

At present, there is lack of a suitable method to move disabled passengers from the Vehicle Deck to the Promenade Deck. This is most apparent for wheelchair users where there is no method for moving between decks. A method or system should be implemented to move these passengers from the Vehicle Deck in order that they can access the facilities offered to all passengers. In addition the current emergency procedure requires passengers to leave the ship in emergency situations from the Bridge Deck. For the sake of a disabled passenger a method of transferring a passenger up to the Bridge Deck or emergency disembarkment procedures on the Promenade Deck should also be provided.

5.1.2 Stairways

Wherever practical the stairs, including access doors should be made wider, and the slope decreased to 45° or less. Also the surfaces on some of the stairs should be upgraded to provide a firm, uniform and consistent surface.

Specifically, step surfaces should be of a firm non-slip material which is uniform and consistent. The stairways on the Prince Edward should be upgraded to the same level as those on the Prince Nova.

5.1.3 Promenade Deck

The following changes should be made to the Promenade Deck to improve accessibility:

- the cafeterias on the ferries should be modified to provide sufficient space for wheelchair traffic in both the waiting line and seating areas,
- at least 5% of the tables provided should have at least 650 mm (25.6 in) of clearance from the floor to the table so it can be comfortably used by a person in a wheelchair,
- cafeteria counter and shelf heights should be adjusted so as not to exceed 1.1 m (3.6 ft) in height,
- washrooms should be redesigned and accessible cubicles provided to accommodate wheelchair passengers. As outlined in the Draft "Barrier Free Standards for Ferry Services", an alternate solution would be to provide a separate unisex wheelchair accessible washroom. It is suggested that the ladies powder room be converted to a unisex accessible washroom, identified by the international symbol of accessibility.

- raised door sills (coamings) should be lowered and/or ramped to permit wheelchair access. The installation of ramps at all exterior doors is recommended. These should be designed so that there are no step changes at the side. For interior doors, it is recommended that the coamings be removed,

- doors should be modified to operate at a minimum pressure of 40N (9 lbs) and doors having a latch type mechanism operated by horizontal levers or vertical handles. In no case should knob-style latches be used,

- tactile cuing for blind and visually impaired persons should be provided on walking surfaces prior to the ramps, doors and staircases. It should also be provided on all hand rails leading to ramps, stairs or emergency exits,

- each vessel should be equipped with at least two wheelchair stations with securement systems in the general lounge area,

- in the main public areas and public washrooms, visual emergency alarms should be installed that automatically flash when the audible emergency alarm is activated,

- visual and audible announcements should be provided.

5.2 ACCESS TO SHIP/BOARDING

There are no problems for disabled or elderly passengers who board the ferry by a vehicle since they follow the normal traffic flow. Disabled passengers who board the ferry without a vehicle by the vehicle ramp also have no obstacles to overcome except for some minor surface discontinuities on the vehicle ramp. However it is a rare occurrence that a disabled passenger boards the ferry without a vehicle.

5.3 TERMINAL FACILITIES

In order to make the terminals more accessible to all disabled/elderly people the following changes and recommendations, based on the analysis of data collected and observations made, should be implemented:

Common to both terminals:

- entrance doors should be made easier to open,

- a choice of heights should be provided for drinking fountains and telephones to accommodate the full range of users, including wheelchair users (Figure 5.1),

- obstacles in normal traffic flow areas should be removed or minimized to provide more direct routes for wheelchair users.

- audible and visual announcements should be made,

Specific to the Caribou Terminal:

- cafeteria counter and shelf heights should be modified to provide easier access to wheelchair user,

- the tray holder height should be higher than the wheelchair armrest

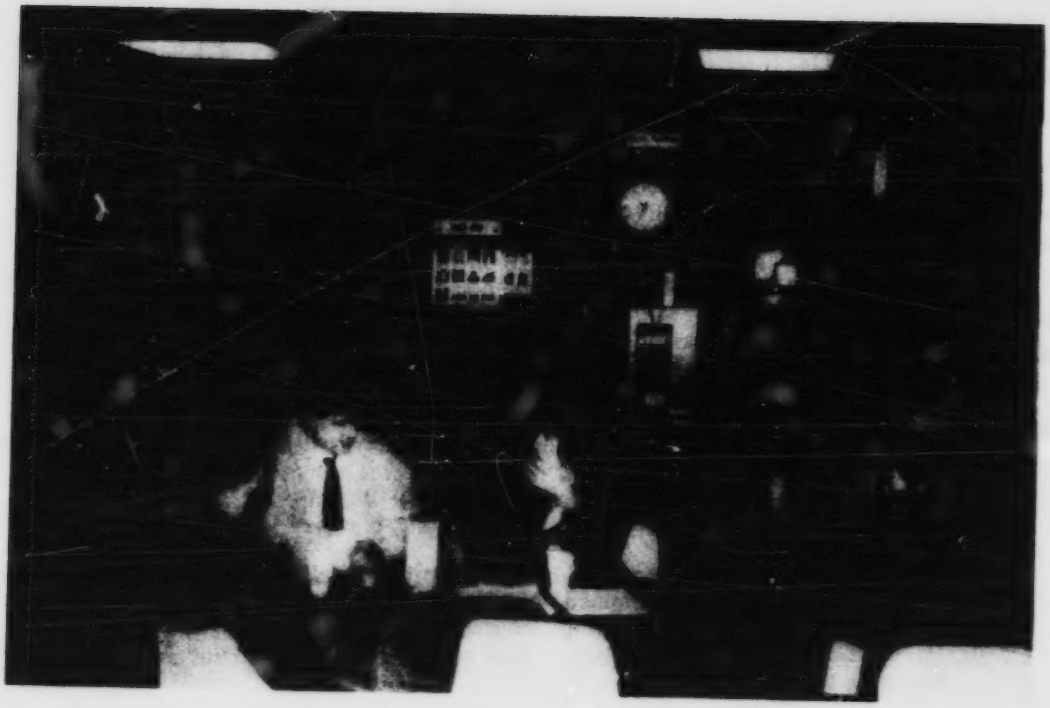


FIGURE 5.1 TELEPHONE HEIGHT AT CARIBOU TERMINAL

- newsstand layout should be improved, with the magazine racks made more accessible,
- the dairy freezers should be made more accessible,
- more space provided for wheelchair traffic in the cafeteria seating area and cafeteria line (Figure 5.2),
- information counter height could be lowered,
- cafeteria tables should be provided for wheelchair users.

Specific to the Wood Islands Terminal:

- accessibility should be improved to the gift shop and cafeteria located on the arrivals side of the terminal. Ramps and/or wheelchair stair lifts could be installed to address this requirement (Figures 2.17 & 2.18),
- a crosswalk should be provided.

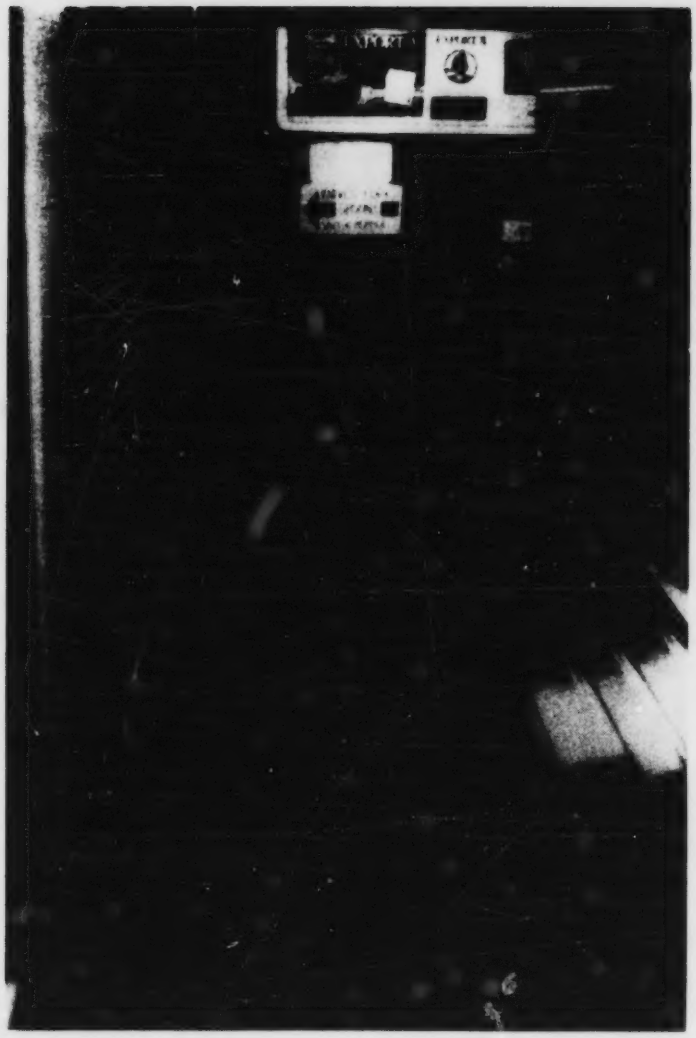


FIGURE 5.2 CAFETERIA LINE AT CARIBOU TERMINAL

6.0 DESIGN REQUIREMENTS OF A LEVEL CHANGE SYSTEM

The design requirements for a level change system to transfer disabled passengers to and from the Promenade Deck of the vessels are outlined in this section. These requirements provide a basis for development of the technical specifications for the design of the system. Important considerations include; safety; technical issues such as size/capacity, reliability/maintainability, environmental factors and vessel interface; cost effectiveness and ergonomics.

Three level change concepts are presently being considered to provide access for disabled passengers from the Vehicle Deck to the Promenade Deck. They are as follows:

i) A combination wheelchair lift and elevator aboard the ferry. The wheelchair lift would take passengers from the Vehicle Deck to the Mezzanine Deck, and the elevator from the Mezzanine Deck to the Promenade Deck. The elevator could also be constructed to have access to the Bridge Deck if required. The wheelchair/elevator system could be located at either the fore or aft end of one of the casings that contain the stairways. Both ferries (Prince Nova/Edward) are essentially similar with only minor differences and the concept is feasible for all of the locations.

ii) An elevator at the docking facilities alongside the ferries which would provide access from the terminal dock facilities to the Passenger Deck of the Vessel.

iii) A ramp at the docking facilities.

Both concepts ii) & iii) would require an adjustable ramp at the vessel to account for tides. A gate(s) would also have to be provided on the ferries.

6.1 SAFETY CONSIDERATIONS

6.1.1 General Safety Considerations

The paramount concern in any level change system should be the safety of any individuals using or in the immediate vicinity of the lift or its components. Adequate protection should be provided against all of the following hazards:

(a) shearing, crushing, trapping, or abrading;
(b) falling or tripping;
(c) physical shock;
(d) electric shock; and
(e) fire.

In the event of a power failure resulting in stoppage of a lift, emergency procedures should be clearly posted and emergency lighting should be provided to illuminate the carriage.

The whole level change system and its components should be designed in accordance with good engineering practice and be constructed with materials free from defects, of adequate strength, and of suitable quality.

Anchorage points for safety belts or safety straps should be provided in the level change

system, with special design considerations being given to rough seas operation of system.

6.1.2 Standards and Guidelines

The system design must comply with all applicable safety standards/guidelines for elevating devices for handicapped people. The standards and guidelines that apply are as follows:

- Canada Shipping Act - Ships Elevator Regulations
- CAN/CSA-B355-M86 - Elevating Devices for the Handicapped
- CAN3-B44-M85 - Safety Code for Elevators
- Marine Policies and Programs - "Barrier free Design Standards for Ferry Services"
- Transport Canada - Policy on Transportation of Disabled Persons.

6.2 TECHNICAL CONSIDERATIONS

6.2.1 Capacity/Vertical Displacement

The system must have the capacity to accommodate one wheelchair passenger and an attendant as a minimum. The size and location must be such that a wheelchair can be manoeuvred into and out of the system by an attendant with ease. The configuration should service all of the required levels in a timely fashion.

6.2.2 Reliability/Maintainability

The design must stress component reliability and maintainability. It is important that the system not require excessive maintenance and that the maintenance which is required can be completed using the standard tools available on the vessel or at least at the terminal. Systems that require sensitive, or fine adjustments should be avoided. The design must also stress ease of maintenance, particularly if complicated mechanisms are involved. The system must be designed such that all maintenance, including that required to release a passenger from a failed mechanism, can be accomplished while the passenger is in position.

The system must be operated from a reliable power supply to prevent passengers from being trapped in a power loss situation.

6.2.3 Environmental Factors

Special considerations must be made due to the fact that the level change system is to be installed in an ocean environment. The most important of these is the corrosive effect on metallic surfaces as a result of the high salt content in the air and water. Protection and precautions must be made to ensure that the safety and normal operation of the system is not compromised by corrosion. The system must also be moisture resistant to prevent damage to components or risk of electric shock. This would require

the use of hermetically sealed motors, transmission and electrical boxes to ensure adequate protection. Another consideration is the systems ability to operate in heavy sea states since the roll and pitch of the ship might adversely affect the normal operation of a level change system.

6.2.4 Vessel Interface

In order that cost be kept to a minimum and that integrity of the ship is maintained, a solution which results in the minimum of modifications to the ship is desirable. Areas which require considerations are

- weight and stability
- structural, flooding and fire integrity
- power requirements
- modifications and mounting of piping systems or cable tray assemblies.

6.3 ECONOMICS

Another important consideration in designing and specifying a level change system is cost effectiveness. To determine a systems cost effectiveness one must consider the cost to purchase a proposed system, the cost of installation, maintenance and inspection costs, operation costs, repair cost and the amount of usage the system will have. For the particular problem at hand, it is foreseeable that the level change system will be used only when a passenger cannot safely or conveniently use the stairs and not by the regular flow of passenger traffic. For this reason it is desirable to minimize capital costs and maintenance costs.

6.4 PASSENGER CONSIDERATIONS

6.4.1 Ergonomics/Human Factors

A solution to the problem of level changes aboard the ferry will require that the ergonomics or human factors be considered at the design or evaluation stage. The intended user of a level change system is a disabled or elderly passenger in which case a system should be provided that caters to their specific needs. Ideally it would be desirable to provide a system for which the disabled passenger requires no assistance. This may not be practical depending on the specific configuration of the system and/or liability or other concerns. In any event, doors, entrances, ramps and controls must be provided that do not require unreasonable body motions, strength or skill.

An ergonomic evaluation of the new level change system might involve the passenger in the following boarding procedure:

- parking his vehicle in a designated area on the Main Deck
- with the assistance of an attendant (ferry personnel)
    - transferring to his wheelchair
    - moving across the deck toward the elevator
    - negotiating ramp(s) as required

- entering the elevator
- securing the wheelchair, or using a seat in the case of elderly passengers
- selecting the appropriate deck level
- releasing the wheelchair
- disembarking from the elevator
- moving to the desired area on the Promenade Deck.

Regardless of the level change system used the success or failure of the system will be determined by the acceptance of the users. The user must feel comfortable about all aspects of the system from the time they board to the time they disembark. Criteria to which the success may be measured in respect to psychological acceptance are:

- ease of boarding/disembarking
- user friendliness
- operation time
- environmental comfort i.e. ventilation, lights, noise, roominess, aesthetics
- feeling of security
- adequate signage.

7.0 TECHNICAL SPECIFICATIONS

This section is meant to provide technical guidelines for the design of the level change systems as introduced in Section 6.0. The specifications for the different concepts are included in the following subsections. The parameters identified in the design requirements (Section 6.0) were considered including applicable safety standards and guidelines. Elements in the specifications are applicable to all three of the concepts.

7.1 ELEVATOR TECHNICAL SPECIFICATIONS

7.1.1 Signage & Controls

a) Elevator entrance/exits shall be clearly marked with the International Symbol for Accessibility.

b) Buttons of the elevator control panel shall be located between the heights of 840 mm (33 in) and 1.40 m (4.59 ft) measured vertically from the floor.

c) Elevator car shall contain an indicator to provide visual and tactile signal showing the current position of the car. A complementary audible signal is highly recommended.

d) Control buttons used to direct or summon an elevator car to a desired floor shall be lettered in Arabic numerals.

e) Control buttons used to initiate door opening, door closing, emergency stop, etc. shall be identified by lettering or pictograms or both.

f) All lettering shall be bilingual and be displayed beside the button and raised or recessed a minimum of 1 mm (0.039 in). Numbers, symbols and pictographs shall be used where appropriate.

g) Minimum size of buttons to be 18 mm (0.7 in) and heat sensitive buttons should not be used.

h) Emergency door operating controls shall be located at the base of the control panel, within easy reach of all passengers.

7.1.2 Lift Parameters

a) Minimum inside dimensions of any elevator shall not be less than 1.40 m x 0.75 m (4.59 ft x 2.46 ft).

b) Minimum rated load and capacities shall be as stated in Appendix F, depending on type of carriage.

c) The maximum capacity and rated load shall be displayed at the operating location.

d) The rated speed of the carriage shall not exceed 0.15 m/s (0.49 ft/s), except enclosed vertical lifts which may have a maximum speed of 0.25 m/s (0.82 ft/s).

e) Acceleration rates during level change shall not exceed 0.15 m/s^2 (0.49 ft/s^2).

7.1.3 Interior Considerations

a) A foldable chair may be installed on a lift for use by persons who do not normally require a wheelchair.

b) A minimum illumination of 50 lux shall be provided at the drive unit, carriage, and landings.

c) A minimum of two lamps installed in a manner such that failure of one lamp will not cause the remaining lamps to extinguish.

d) Emergency lighting of at least 2 lux required to illuminate the carriage for 1 hour shall be provided.

e) At least two handrails shall be provided in each elevator and three in lifts where there is only one door. Handrails shall be located 840 mm (33 in) measured vertically from the car floor and have clearance of 40 mm (1.57 in) between the wall and inner edge of rail. Handrails shall be able to withstand a force of 1.25 KN (281 lbs) without flexing.

f) All projections, edges or sharp corners shall be protected or rounded to prevent injury.

g) Anchorage points for safety belts or safety straps shall be provided where applicable. They must be accessible for users for easy removal and installation in emergency situations.

h) Temperatures should be maintained between 18°C (64°F) and 27°C (81°F) as reasonable as possible.

i) A recommended ventilation rate of 0.57 m^3/min/person (20 ft^3/min/person) should be provided.

7.1.4 Entrance/Exit

a) The maximum distance between the elevator floor sill and the shaft shall be 15 mm (0.6 in).

b) The minimum time for elevator door to remain fully open shall be 5 seconds. Opening and closing of the door shall be capable of being operated through the use of open/close buttons on the control panel.

c) Elevator shall be equipped with an automatic self-levelling device.

d) Elevator doors shall be provided with an automatic reopening device which will stop and open the doors in case of an obstruction. Two electric eyes, located at heights of 100 mm (3.9 in) to 140 mm (5.5 in) and 725 (28.5 in) to 750 mm (29.5 in) shall be used to detect an obstruction.

e) Minimum clearance when elevator door is fully opened shall be 810 mm (31.9 in).

f) When necessary, ramps shall be provided for ease of exit/entrance of the lift. Ramps shall be radiused and shall not exceed 15 mm in (0.6 in) thickness.

7.1.5 Safety Considerations

a) In the event of a power failure a secondary power source or mechanical means shall be provided to move the lift.

b) An emergency stop button, red in colour, marked STOP that will when activated cause the power to be removed from the drive unit shall be provided.

c) An audible alarm shall be actuated by the emergency stop switch or by a separate switch marked ALARM. In the event of a failure of normal ship power, the alarm will remain operative.

d) An upper and lower limit switch shall be provided at each end of the travel.

e) Overspeed governors shall be incorporated to limit speed of the lift to 150% of rated speed.

f) Where a vertical platform lift is suspended by wire ropes, there shall be a minimum of two ropes. The rope will have a safety factor of 7.6 based on a rated full load and have at least a minimum breaking load of not less than 7.85 KN (1765 lbs). The suspension ropes will not have a diameter of less than 6.2 mm (0.24 in) for elevator rope and 3 mm (0.12 in) for aircraft rope.

g) The drive unit shall be provided with brake capable of bringing the platform with 125% rated load to a complete stop within a distance of 20 mm (0.79 in).

h) A passenger should not be exposed to moving or rotating components.

7.1.6 Environmental

a) The lift shall be capable of operation in temperatures ranging from -40°C (-40°F) to +40°C (104°F).

b) All materials used will be of a type that is resistant to corrosion in a salty environment or be treated with to provide adequate protection.

c) All electrical components must be moisture resistant.

d) All mechanical components must be hermetically sealed.

7.2 WHEELCHAIR LIFT SPECIFICATIONS

In addition to the applicable specifications for the elevator, the following specifications are to apply to an open type vertical lift system.

a) An unenclosed vertical lift platform shall serve two terminal landings only

b) The unenclosed vertical platform lift shall not exceed a travel of 2500 mm (98.4 in)

c) An unenclosed vertical lift platform shall not penetrate any floor

d) The wheelchair lift platform shall include safety gates or doors.

e) The door or gate interlocks shall prevent normal operation of the machine unless the gate is locked in the closed position and shall not open unless the platform is within 50 mm (1.97 in) of the landing.

7.3 RAMP SPECIFICATIONS

The following specifications apply to a ramp as discussed in Section 6.0.

a) The ramp shall have a maximum slope of 1:4.

b) The ramp shall have a non-skid surface.

c) The ramp shall be equipped with handrails which conform to the following specifications;

- The handrails shall be round and smooth with an outer diameter ranging from 32 mm (1.3 in) to 45 mm (1.8 in) and a height ranging from 800 mm (31.4 in) to 920 mm (36.2 in) measured vertically from the ramp.
- The distance between handrails bounding a ramp shall not exceed 1.65 m (5.4 ft).
- The handrails shall extend a distance of 450 mm (17.7 in) beyond the top of the ramp and 300 mm (11.8 in) beyond the bottom of the ramp.
- The handrail shall have sufficient strength to sustain a force of 1.25 kilonewtons (281 lbs) in any direction at any point without flexing.
- Handrails shall have textured grips as cues for the blind and vision impaired and also be finished in colours which contrast distinctly with their environs.
- Handrail supports shall be widely spaced to prevent unnecessary breaks in the grip and the gripping surface of the handrail shall not be interrupted by newel posts.

8.0 PRELIMINARY CONCEPTS

This section details the three level change systems being considered to provide access for disabled passengers to the Promenade Deck. The design requirements for these systems are detailed in Section 6.0. The technical specifications for each of the three systems are detailed in Section 7.0.

The three preliminary concepts were chosen based on an analysis of the vessels under consideration and identified constraints. Compliance with the design requirements discussed in Section 6.0 was the key factor in the choice of preliminary concepts.

The following sections discusses each of the concepts in more detail.

8.1 SHIPBOARD ELEVATOR AND WHEELCHAIR LIFT

The stairways that passengers use to access the Promenade Deck are located inside the two ships casings located on the port and starboard sides. Usable inside casing dimensions is only 84 cm (33 in), therefore retrofit of an escalator or elevator inside the casing is not practical. It would also not be practical to expand the casing to accommodate an elevator trunk as this would have a major impact on the vehicle traffic flow and available space for vehicles to park.

There are however four locations that an elevator can be installed on board which would provide service to the Promenade Deck (and the Bridge Deck if required) from the Mezzanine Deck. Figures 8.1 and 8.2 show proposed elevator locations in forward and aft locations on the vessel. These can be located either on the Port or Starboard side. In all of the proposed locations, no major deck structure at any level would be affected by the installation of an elevator trunk, although some minor pipe rerouting and equipment relocation would be required. For an elevator in the forward location, the ships sidescreen on the promenade and mezzanine level would have to be plated with steel. In the aft location, only the promenade deck sidescreen would require this modification. The full scale drawing, Concept Arrangement, DRG. No. 7349-418-01 and the Single Line Diagram, DRG. No. 7349-600-01 have been included at the back of this report.

The elevator could be a cable suspension configuration, or a hydraulically operated elevator. The elevator would be powered by the existing ships power supply and also connected to the ships UPS system (Uninterrupted Power Supply) so as it can be operated in emergency procedures.

Service from the vehicle deck to the Mezzanine Deck is still required. This can be accomplished by using a wheelchair platform lift. To minimize obstruction of vehicle traffic the platform lift would normally be stored at the Mezzanine Deck. The platform would only be lowered if required and when the area below it on the vehicle deck is clear. A portable ramp would be used to board the platform lift at the vehicle deck. The ramp would face out toward the side of the ferry and would only be in place when required. The platform lift and portable ramp are shown in Figures 8.1 and 8.2. A disabled passenger boarding the ferry would notify an attendant at the toll booth. The disabled person would be directed to park in a designated area while boarding of the ferry commences. Once notified, the disabled person would drive his/her vehicle onto the ferry and park beside the platform lift. An attendant would put the ramp in place and assist the disabled person into the platform lift and eventually to the Promenade Deck. Disembarking the ferry would be done in the reverse of the above procedures.

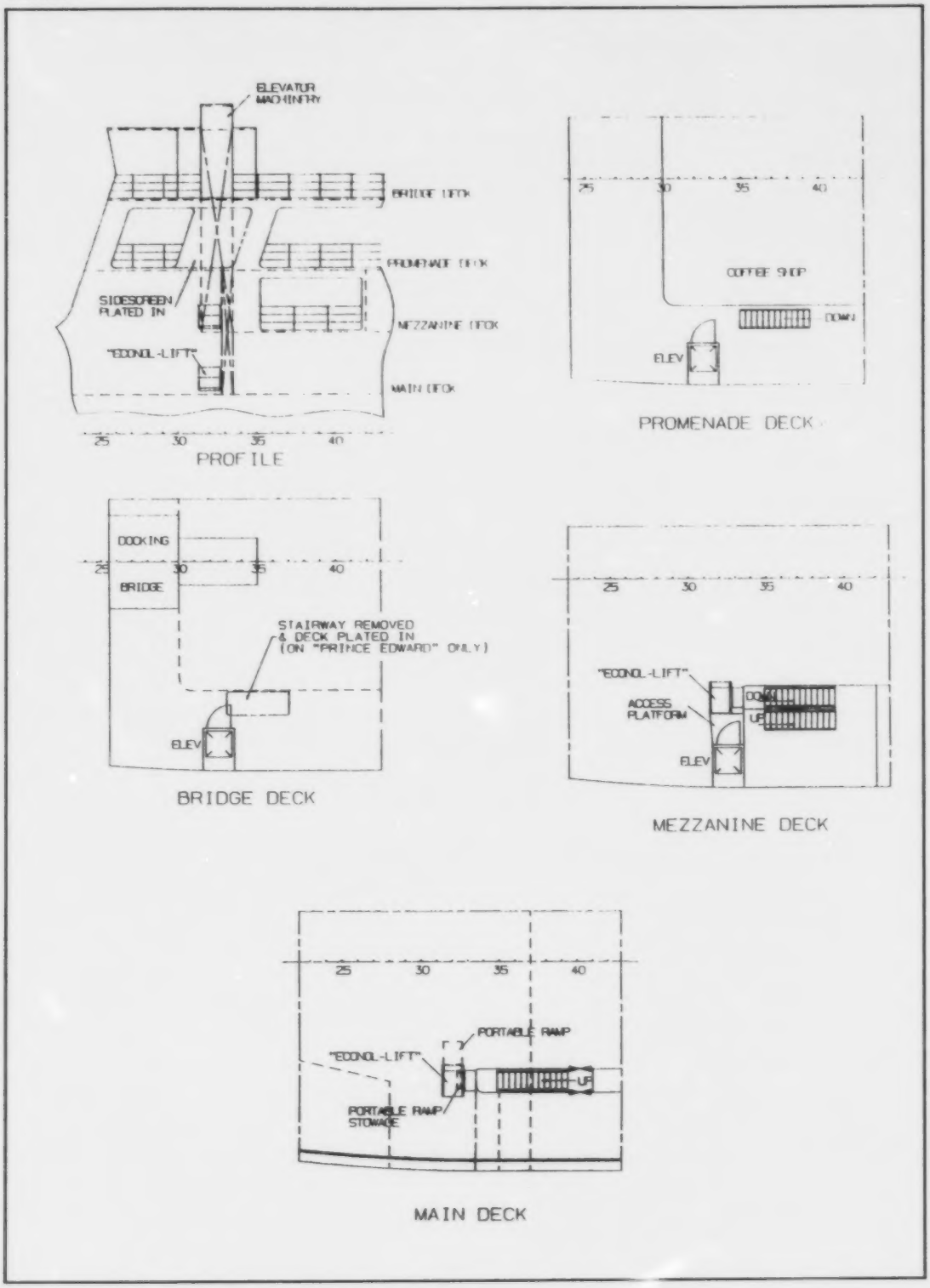
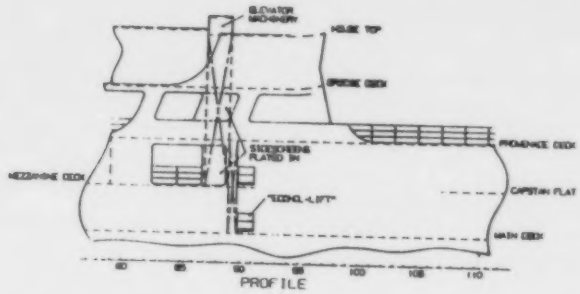
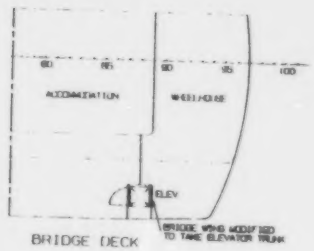
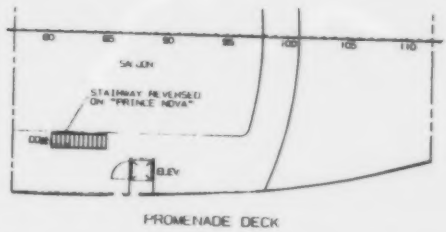
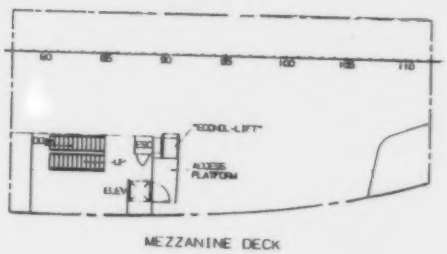


FIGURE 8.1 ELEVATOR IN AFT LOCATION









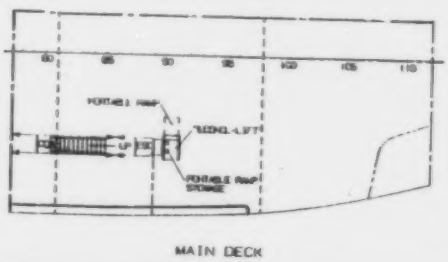


FIGURE 8.2 ELEVATOR IN FORWARD LOCATION

Additional crew would not be required for this concept. One crew member would be required to assist the disabled passenger from the vehicle to the Promenade Deck, as presently done.

This level change system would have a minimal impact on the overall weight and stability of the vessel. Vehicle traffic flow may be disrupted slightly but the overall vehicle capacity of the ferry should not change.

The budgetary cost for this system is approximately $150,000 Canadian Dollars per ship with an annual maintenance cost of $1000-$1500. Additional operating costs for this level change system, including the cost of additional crew, are expected to be minimal since the system will only be used for disabled people.

Technical specifications governing the design of the elevator and platform lift, as discussed in Section 7.0, will be adhered to. The applicable design requirements detailed in Section 6.0 will also be included.

8.2 DOCKSIDE ELEVATOR

An alternative to having an elevator on-board the ship is to locate an elevator at dockside that would provide the disabled passenger access to the Promenade Deck. The disabled passenger could board the ferry at the Promenade Deck. This concept is shown in Figure 8.3.

The main problem with a dockside elevator is the 3.7 m (12 ft) change in water level due to tides. A ramp would be required to access the Promenade Deck from the elevator. Details concerning the ramp are given in Section 8.3. The elevator would be housed in a building at dockside and the ramp would extend out to the Promenade Deck from the upper elevator landing.

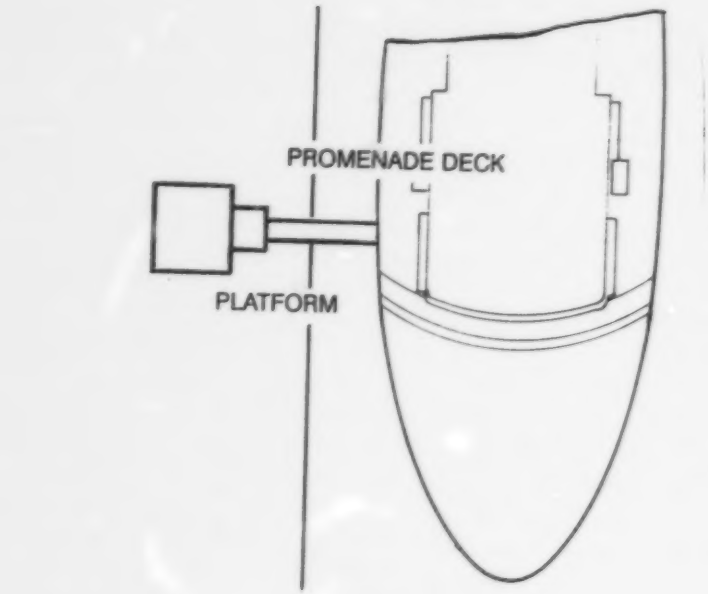
Lift size and capacity is less of a restriction for this concept. More than one passenger could be moved at a time but the elevator would not normally be used by all passengers boarding the vessel without a vehicle. In this regard a single ramp as discussed in Section 8.3 may be more feasible. The modifications to the actual vessel would be minimal. These would include a ramp landing complete with railings and gate(s) on the vessel. This concept will have a minimal impact on the ferry in terms of weight and stability. Vehicle capacity would not be affected with this concept.

Technical specifications governing the design of the dockside elevator and ramp, as discussed in Section 7.0, will be adhered to. The design requirements of a level change system, as discussed in Section 6.0, will be included if applicable to this system.

Since the elevator/ramp is only used for disabled passengers it may not be used all the time. The ramp would remain in the up position until required. An attendant would be required to load and unload the disabled persons vehicle if they were travelling alone. The additional liability insurance required for the crew to drive the passengers vehicles will also have to be addressed. Additional crew would probably be required for this concept depending on the number of disabled passengers using the system and to what extent ferry personnel are required to drive the passengers vehicles.

The budgetary cost for this system is approximately $80,000 to $100,000 Canadian Dollars per terminal with an annual maintenance cost of $1000-$1500. Additional operating costs for this level change system, excluding the cost of additional crew, are minimal.

F89123



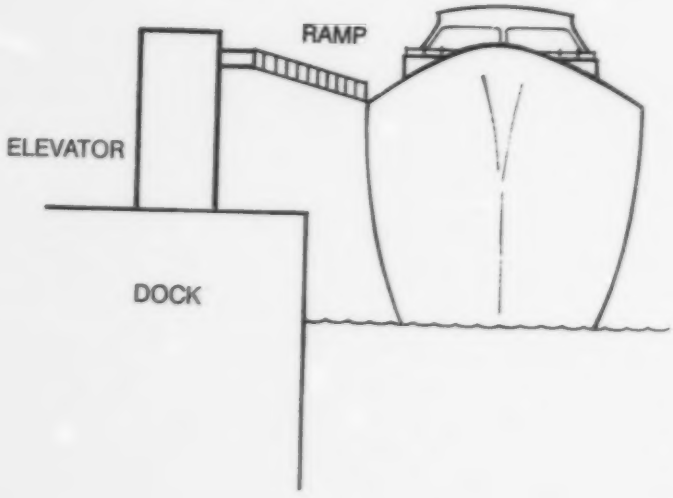


FIGURE 8.3 DOCKSIDE ELEVATOR

The building which houses the elevator could also be fitted with a staircase. This would enable passengers without a vehicle to board the ferry at the Promenade Deck.

8.3 DOCKSIDE RAMP

A ramp constructed at dockside, that could be used by all passengers boarding the ferry without a vehicle, would be relatively inexpensive to build and maintain. This concept is shown in Figure 8.4.

A disabled person with a vehicle would board the ferry at the Promenade Deck via the ramp. Presently passengers boarding the vessel without a vehicle do so by the main vehicle ramp. The ramp concept would alleviate this requirement.

The dockside ramp will join directly with the Promenade Deck. This concept will have a minimal impact on the ferry in terms of weight and stability. Vehicle capacity on the ferry will not be affected by the ramp. Modifications to the ferry would include incorporating a ramp landing complete with railings and gate(s). The ramp will also be constructed in a manner which allows it to move vertically, at the ferry, a total of 12' due to tides.

The technical specifications governing the design of a ramp, as discussed in Section 7.3, will be adhered to. The design requirements of a level change system will be included where applicable, to this system. Section 6.0 details the design requirements.

Additional crew requirements for this concept would be similar to that for a dockside elevator as discussed in Section 8.2. Other passengers boarding the ferry without the vehicle could use the ramp as well. The ramp would then be used every time the ferry docks providing people are there to use it. An attendant would also be required to load and unload the disabled persons vehicle. The additional liability insurance required for the crew to drive the passengers vehicles will also have to be addressed.

The budgetary cost for the dockside ramp is approximately $40,000 to $50,000 Canadian Dollars per terminal with an annual maintenance cost of $500. Additional operating costs for this level change system, excluding the cost of additional crews, are minimal.

F89123

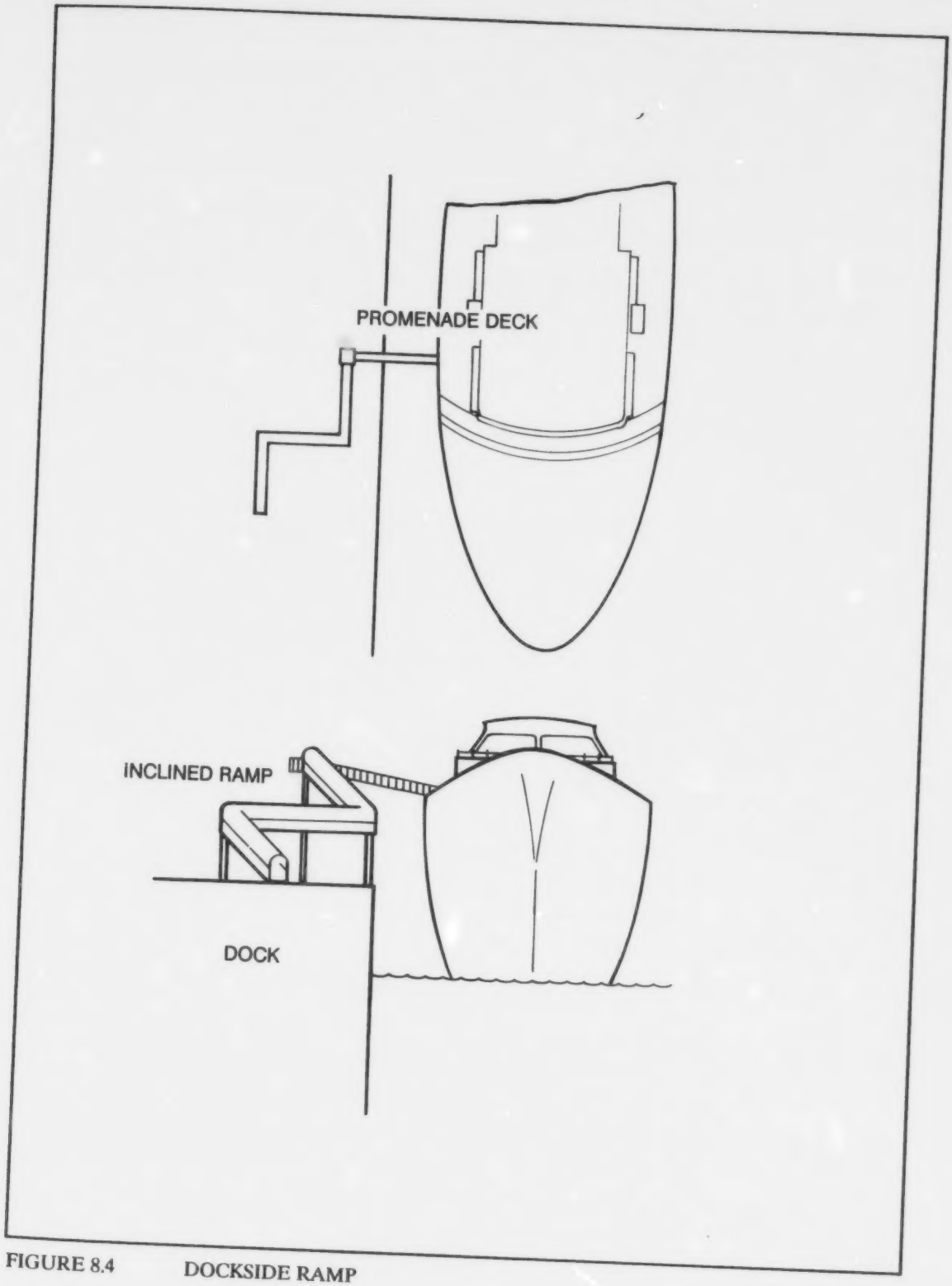


FIGURE 8.4 DOCKSIDE RAMP

9.0 EVALUATION CRITERIA FOR CONCEPT SELECTION

In order to select the most feasible level change system aboard the vessels under consideration, a complete evaluation process will be followed. The following subsections describe the criteria used in the evaluation process. These criteria were chosen to give as complete as possible evaluation of each level change system. A weighted evaluation will be required since all evaluation criteria are not of equal overall importance.

9.1 COSTS

The total cost of each level change system, as discussed in Section 6.3, will be considered. Total costing will include the following costs;

- design costs
- fabrication and installation costs
- maintenance costs
- operational costs

9.2 SHIP INTEGRATION/IMPACTS

All of the level change systems being considered will have an impact on the vessels under consideration. The extent of these impacts will be reviewed for each overall system. The areas of concern are the following;

- extent of modifications
- impact on capacity of vessel
- impact on weight/stability
- impact on power generation/distribution.

A level change system which requires extensive modifications to the vessel and reduces the capacity of the vessel may be regarded as unfavourable. These impacts will be compared to the suitability for the disabled user and expected usage of the system when evaluating a level change system.

9.3 OPERATIONAL CONSIDERATIONS

Operational considerations, including staffing requirements, will be considered. An estimate of the expected usage of the level change system is required for the review of staffing requirements.

9.4 SUITABILITY FOR DISABLED USERS/ATTENDANT

The suitability for the disabled users/attendant is a major factor in the evaluation of the level change systems. Consideration will be given to the following;

- ergonomics
- user friendliness
- psychological acceptability.

These points are viewed as being very important since the level change system is being considered strictly for the disabled. An inexpensive and simple level change system may not be considered feasible if it is not suitable for the application. A detailed discussion of these points is given in Section 6.4.

9.5 SAFETY CONSIDERATIONS

The safety of any level change system is of paramount importance. All aspects of the level change system will be evaluated from a safety standpoint. Safety considerations will be given to disabled users, attendants and also to the general public. Detailed discussion on safety considerations is given in Section 6.1 and Section 7.0.

10.0 CONCEPT SELECTION/DOCUMENTATION

This section details the evaluation of the three concepts presented in Section 8.0 and includes the selection and documentation of the chosen concept.

10.1 EVALUATION OF CONCEPTS

The different concepts proposed in Section 8.0 were evaluated against the criteria established and described in Section 9.0. Other considerations were also utilized in the evaluation as discussed in the following subsections.

10.1.1 General

The three level change concepts presented in Section 8.0 use two different approaches for boarding passengers. Section 8.1 describes a shipboard system that is integrated into the vessel and does not impact on dockside facilities or procedures. Sections 8.2 & 8.3 describes dockside concepts (elevator and ramp) that impact on both the dockside facilities, and the vessel to some extent.

Ramps are viewed as a viable approach and are used extensively on the west coast where a high level of pedestrian traffic exists between the mainland and the islands. The majority of the traffic serviced by the two vessels considered in this study is vehicular, however. Almost all of the physically disabled passengers arrive in vehicles.

Elevators and/or wheelchair lifts are the preferable method for transferring wheelchair passengers from one level to another. There are no slopes to negotiate and the passengers generally feel more secure. The elevators or wheelchair lifts also take up less room than other modes, such as ramps and escalators.

10.1.2 Cost

Given that the other criteria are all satisfied, cost is the major consideration in the concept selection. All costs must be considered including design, fabrication and installation as well as maintenance costs. In addition, liability insurance requirements and operational costs may also have a large impact, especially if additional personnel are required to operate the device and/or provide other required support services. Table 10.1 includes a summary of the budgetary costs and factors affecting costs for the three concepts.

Based on these figures, the dockside ramp is the lowest cost option. Additional personnel would probably be required to operate this system. This would also be the case for the dockside elevator. This factor would have a major impact on the overall cost of the system over time.

It is felt that at least two additional attendants would probably be required for the operation of both dockside systems in order that the schedule for loading and unloading is not adversely affected. This would of course depend on usage rates. See Section 10.1.4 for further details.

No additional crew personnel should be required for the operation of the shipboard system. As a result the daily operational costs should be much lower than for the other two systems. This will result in the lowest total costs for the system.

	BUDGETARY COST	MAINTENANCE COST	ADDITIONAL CREW	LIABILITY INSURANCE
Shipboard Elevator and Wheelchair Lift	150,000	1,000-1,500	0	N/A
Dockside Elevator	80,000-100,000	1,000-1,500	1	Required
Dockside Ramp	40,000-50,000	500	1	Required

TABLE 10.1 BUDGETARY COSTS AND FACTORS AFFECTING COSTS FOR THREE LEVEL CHANGE CONCEPTS (PER SYSTEM)

10.1.3 Ship Integration/Impacts

None of the concepts proposed would result in extensive modifications to the vessels. The shipboard system requires the most modifications to the vessel, including power requirements.

10.1.4 Operational Considerations

The operational considerations used in the evaluation of the three systems were as follows:

- The requirement of additional attendants to operate each system.
- The operation of the system(s) during rough seas and operation during all environmental conditions expected.
- The access of the system by disabled users.
- Operational safety levels.
- Ease of entry and exit along with the total time to perform this function.

Based on these considerations, it was felt that the shipboard wheelchair lift and elevator systems would provide the most advantageous combination of operational factors. No additional crew attendant requirements are anticipated, and more favourable performance is expected during operation in rough sea states, when compared to the dockside systems.

One situation that may cause concern from time to time is if many persons with disabilities board the ferry at the same time (i.e. on a bus). If all of the passengers are required to be transported from the Main deck to the Promenade deck at the start of the voyage and back again at the end of the voyage, delays in the sailing schedule will result. Based on conversations with the ferry service personnel this situation occurs infrequently and therefore it is not considered practical to install a system capable of accommodating a large number of people at the same time.

10.1.5 Suitability for Disabled Users/Attendants

The three proposed level change concepts were evaluated for suitability for disabled persons using the considerations given in Section 6.4. Table 10.2 summarizes the suitability considerations for the disabled for each system. The wheelchair lift and elevator system affords the disabled users more security, with well known and accepted technology. With the wheelchair lift and elevator system the passenger can park his vehicle in a designated area on the main deck, and then move around on his or her own without assistance. Access to all levels is also possible with this system. In addition this system does not require additional crew members to operate.

The time to load and unload the disabled passenger(s) will most probably be the highest for the dockside elevator and dockside ramp systems, especially when a high number of other pedestrians is present at dockside and using the systems to board.

SYSTEM	EASE OF ENTRY/ EXIT	ACCEPTANCE BY USERS-USER	TIME REQUIRED TO LOAD/ UNLOAD FRIENDLY	ENVIRONMENT COMFORT	ATTENDANT TIME REQUIREMENT	TRANSFER FUNCTIONS REQUIRED	SYSTEM VESSEL INTERFACE	LEVELS OF ACCESSIBILITY
Shipboard Elevator and Wheelchair Lift	Good, easy to enter, exit	Good, used to elevators/ wheelchair lifts	Low	High, good lighting, ventilation, protected from the	Very low. Number of attendants one elements	On ship, wheelchair to elevator, and wheelchair lift, no max. at each system	Very good, minimal problems anticipated additional vehicle movement	All, Main, Mezzanine, Promenade & Bridge Decks
Dockside Elevator	Good, easy to enter/exit, dependant on dock/ship alignment	Good, used to elevators	Low to Medium	Medium, partially external, probable external vehicle exit/entrance necessary by passengers	Medium to high. Vehicles have to be driven on by attendants	Dockside, wheelchair to elevator then to ship, vehicle movement required by attendant, elevator attendant required	Good - some problems might be encountered due to tides & ship loading states	Promenade Deck only
Dockside Ramp	Good, dependant on dock/ship alignment	Good, but length of ramp, slope and other considerations would produce a lower acceptance - weather	Medium, potential traffic flow problems if pedestrian traffic is high	Medium probable external passenger exposure	Potentially high. Time and attendants requirements, similar to dockside elevator system	Dockside, wheelchair on ramp to ship, vehicle movement required by attendant	Good, some problems might be encountered in docking/ alignment due to tides, etc.	Promenade Deck only

TABLE 10.2 SUITABILITY CONSIDERATIONS FOR DISABLED- FOR THREE SYSTEMS ANALYZED

The predicted environmental comfort levels are most favourable for the wheelchair lift and elevator system. The dockside elevator and dockside ramp are less favourable, due to the fact that there will be some exposure of the occupants to the elements, during external transfer of the disabled passengers from the vehicle to the dockside system and onto the vessel.

The dockside systems provide access to only one level on the ferry. As a result additional on-board systems would be required to provide access to the other levels if required.

10.1.6 Safety Considerations

The safety considerations as discussed in Section 6.1 and 7.0 were considered for the three systems. Based on the information collected and evaluated the following concerns are noted for each system.

The dockside ramp is the least complex of the three systems as far as the mechanical and electrical components go. As a result the least number of safety considerations and standards are of concern and/or have to be addressed in the design of the system. The main safety concerns are the ramp angles, ramp surface materials to provide a non-slip surface under all operating conditions, lighting requirements, and handrail size and locations.

The other two systems, the dockside elevator and the on-board wheelchair lift and elevator have similar safety concerns and applicable safety and design standards.

With both of the systems several areas present potential safety hazards. The hazards of electrical shock, trapping, crushing, fire and power loss situations were all considered and addressed in the development of the technical specifications.

If all of the technical specifications developed are incorporated in the design, construction and installation of each system, no serious safety design and operational problems are foreseen.

Safety features need to include systems to prevent possible door(s) closing on the occupants, luggage or wheelchairs. In addition, backup electrical power is required for system operation and lighting in case of main line power failures.

10.2 CONCEPT SELECTION

Based on the above, the shipboard elevator and wheelchair lift system concept was selected as the best system for implementation. The major factors determining the outcome of the selection were:

- total costs, including operational costs
- ship integration/impacts
- operational considerations
- safety considerations
- suitability for disabled users/attendants.

Based on costs, the dockside ramp is the least expensive to build and install, but requires additional attendants for operation. This would add considerable manpower and liability

insurance costs to the operation of the system. The same holds true for the dockside elevator system. It is also less expensive to build and install, initially, but the operating costs are higher due to the extra attendant(s) needed. The costs are summarized in Table 10.1.

As a result it was concluded that the most economic, selection is the elevator, wheelchair lift system.

The ship integration/impact factors did not have a large influence in the selection of concept. No real problems were perceived for any of the systems.

The operational considerations also played a role in the concept selection as discussed in Section 10.1.4.

Servicing and maintenance was also an important consideration. The on-board system would be integrated into a single existing system (the ferry) reducing potential problems with maintenance, etc. Personnel on-board the vessel are generally more technically inclined and more familiar with the type of equipment selected. They are therefore better suited to ensure that the equipment is properly serviced and maintained.

10.3 CONCEPT DOCUMENTATION

The following sections document the concept selected, the shipboard elevator and wheelchair lift system.

10.3.1 General

The system selected for providing access to the different levels of the ferry is a vertical wheelchair lift system to provide service between the main deck and mezzanine deck, and an elevator system to provide service between the mezzanine, promenade and bridge decks. The following subsections provide additional information on the different aspects of the system selected.

10.3.2 Elevator

A cable suspension type configuration or a hydraulically operated elevator is recommended at the pre-selected elevator locations (Section 8.1).

The system will be weather-proofed and provided with electrically and mechanically interlocked doors.

An elevator system, such as the "Prolift" by Concord Elevator Inc. is recommended. The system will have the following features:

- service for three levels, total travel 4800 mm (16' 0"),
- required pit depth of 300 mm (1' 0"),
- required overhead of 2400 mm (8' 0"),
- two fireproof doors,
- lift capacity 454 kg (1000 lbs),
- operation by key and push buttons,
- alarm and stop buttons,

- manual lowering system,
- speed 0.15 m/sec (0.49 ft/sec)
- meets or exceeds C.S.A. B-355 Safety Standards for elevating devices,
- emergency lights.

10.3.3 Wheelchair Lift

The recommended wheelchair lift is the Econo-Lift Model VL 96, which is an open type wheelchair lifting system. The system will be weather proofed, and provided with an electrically and mechanically interlocked gate. The system has the following features:

- emergency stop switch on moving platform
- grab rail
- flip seat
- 315 kg (700 lbs) capacity
- hand crank lowering device
- weather proofed for outside use (i.e. mechanical, electrical)
- travel up to 2438 mm (96")
- adjustable limit switches
- platform safety diaphram under platform
- a 1220 mm x 737 mm (48" x 29") ID platform size.

10.3.4 Electrical

The electrical requirements for the wheelchair lift are 220V AC. 110V AC is also possible. The electric motor is a 1.1 KW (1½) HP motor. An alarm bell, emergency stop and adjustable limit switches are also provided. Emergency interior lighting, and an alarm will also be provided meeting the requirements of "Barrier Free Design Standards for Ferry Services".

The electrical requirements for the emergency elevator system are 220V AC, minimum at 30 amps. An alarm and emergency stop buttons will be provided. Emergency lights will automatically operate in the event of a power failure.

10.3.5 Installation

The wheelchair lift installation requirements are as follows:

- attachment of device on one bulkhead
- overall dimensional requirements - minimum of 1410 mm x 1270 mm (55½" x 50")
- the unit to be weatherproofed for a wet, salty environment
- electrical hookup to the shipboard electrical system, using approved methods.

The elevator installation requirements are as follows:

- the unit will be weatherproofed for a wet, salty environment
- electrical hookup to shipboard electrical system, using approved methods
- some ship side screen modifications required.

10.3.6 Operation & Signage

The level change system should normally be locked and operated only by a qualified shipboard attendant. Signage should be provided at each level that the system accesses stating required information.

11.0 FOLLOW ON PLAN

The following subsections detail the follow-on plan for the implementation of the level change system. Included are the feasibility of the proposed system along with the preliminary plan for design, construction/installation and evaluation.

11.1 FEASIBILITY

The on-board wheelchair lift and elevator system meets all of the requirements for between deck transfers for wheelchair and other physically disabled passengers, and satisfies the federal government's mandate to provide accessible transportation services to disabled passengers.

11.2 PLAN FOR PHASE II - DETAILED DESIGN/CONSTRUCTION, AND PHASE III EVALUATION OF THE SYSTEMS INSTALLED

The approach recommended for Phase II and III is to perform a detailed design, based on the previous evaluations and analysis, followed by procurement, fabrication and installation of the two systems (one on each vessel). Once installed the systems would be tested, and commissioned. The evaluation plan would be developed after the system is installed and operational. The evaluation of the system would include engineering and human factors criteria, to ensure an acceptable system that would offer the utmost in safety and user acceptance.

11.3 APPROACH/METHODOLOGY

The following tasks describe the proposed project methodology.

11.3.1 Phase II - Detailed Design/Construction

The following sequence of tasks will be undertaken under Phase II:

Task 2.1 - Project Initiation/Management

Upon approval, key members of the project team will meet with the clients to discuss project implementation. Any details which require clarification will be discussed and the scheduling of the project tasks undertaken.

During the project the following project management activities will be conducted:

- developing a detailed work plan and tracking the progress of the project with regard to the work plan
- liaising with sub-contractors and technical authority
- coordinating the project teams efforts
- overseeing the contract administration.

Task 2.2 - Detailed Design

The detailed design will be based on the technical specifications as previously developed. The ergonomic considerations for operation and appearance characteristics of the

systems will also be included in the detailed design.

The exact dimensions, speeds, acceleration, safety interlocks, electrical hookup and backup requirements would be addressed. All applicable safety standards and design recommendations will be utilized as a guide in the final detailed design of the systems.

The relevant standards quoted will be applied in the positioning of all controls, hand railings, deceleration/acceleration rates, ramp angles, lighting requirements and entrance/exit approach angles.

The output of this task will be an engineering analysis and a set of drawings sufficient for the construction and installation of the systems.

The drawings will be submitted to the Canadian Coast Guard and the Ship Classification Society for approval.

Task 2.3 - Procurement

During this task all of the required hardware and material will be obtained. Emphasis will be placed on identifying and procuring long lead items at the beginning of this task such that the project is not unduly delayed.

Task 2.4 - Fabrication/Installation

During this task all aspects of the fabrication and installation will be conducted. These will include:

- confirmation of "as fitted" drawings
- required modifications to the vessels
- welding and installation of any supporting structures
- relocating of piping, equipment, fittings, etc.
- assembly and installation of wheelchair lifts and elevators
- electrical/mechanical interfaces
- installation of all components and accessories
- painting and weatherproofing as required.

Task 2.5 - Functional Testing/Commissioning

Following completion of the installation, the systems installed will be powered up and operated through all possible functions and conditions. Fail safe operation, power failures, and possible jamming and pinching situations will be investigated and tested for. Compliance with all of the specifications developed in Section 7.0 will be evaluated.

The testing will consist of the following specific tests:

- entry/exit tests using a wheelchair occupant, designed to evaluate ease of entry, exit, operation of ramp, doors, door interlocks, etc.
- access to handrails
- operation of controls by crew member
- power failure test, evaluation of system for the ability to be moved to the upper or lower designed position to allow exit/entrance
- check out tests of all interlocks, adjustable limit switches, emergency stop, alarm bell
- lighting levels.

Task 2.6 - Evaluation Plan

A detailed evaluation plan will be developed to assess both systems for the following mechanical and human factors considerations.

Human Factors Considerations

- appearance, obstruction problems and other ergonomic considerations
- ease of operation, entry/exit
- operation/function of all switches, doors, etc.

Mechanical Factors

- total system reliability
- operation under expected environmental conditions, cold/hot, humid, corrosive
- fail safe operation, all concerns developed by consultants and the technical authority will be addressed
- ease of maintenance, repairs.

The evaluation plan will be structured using good engineering approaches and practices. Where applicable standards specify performance and acceptance levels, these will be utilized. Where specific performance and safety concerns are not addressed in existing standards and regulations, performance levels and acceptance criteria will be developed and used in the evaluation and rating of the systems. Specific evaluation and test procedures will be developed as well as data sheets. This will ensure that all evaluation of test steps are performed and that all pertinent data is collected.

Task 2.7 - Documentation

Task 2.7.1 - Technical Documentation

The following working technical documentation will be prepared:

- detailed design, as developed in Task 2.2
- the detailed design will be presented to the Canadian Coastguard Safety Branch for approval, before any installation proceedings
- Fabrication/Installation requirements as developed in Task 2.4
- results of the Functional Testing and Commissioning as performed under Task 2.5
- Evaluation Plan as developed under Task 2.6.

11.3.2 Phase III - Evaluation

The following sequence of tasks will be undertaken under Phase III:

Task 3.1 - Project Management

During the project the following project management activities will be conducted:

- developing a detailed work plan and tracking the progress of the project with regard to the work plan
- liaising with sub-contractors and technical authority
- coordinating the project teams efforts
- overseeing the contract administration.

Task 3.2 - Conduct Evaluation

The evaluation plan developed in Section 11.3.1, Task 2.6 will be utilized for this task. The evaluation will include installation and field trial evaluation, as well as technical, operational and ergonomic factors evaluation and performance ratings. The goal of this ergonomic evaluation is to assess the passenger/operation/attendant acceptance of the new wheelchair lift and elevator.

Task 3.3 - Documentation

Complete documentation on the evaluation testing will be provided. Professional quality illustrative material (35 mm slides) will also be provided documenting the installation and features of the prototype systems installed, as well as pertinent evaluation procedures and test results.

A final report, consolidating all previous draft reports, technical documentations and drawing packages will be prepared and submitted.

11.4 WORK PLAN/SCHEDULE

Table 11.1 summarizes the schedule for Phases II and III. The estimated total project duration, including detailed design, fabrication/installation, testing/evaluation and documentation is 20 months. Figures 11.1 and 11.2 provide detailed schedules for Phase II and Phase III respectively.

MONTHS	DESCRIPTION
	Phase II
0	Project Initiation
0-2	Detailed Design
3-4	Approval
4-6	Procurement
6-9	Fabrication/Installation
10	Functional Testing/Commissioning
10	Evaluation Plan
10-12	Documentation
	Phase III
11-18	Conduct Evaluation
18-20	Documentation, Final Report

TABLE 11.1 SCHEDULE SUMMARY

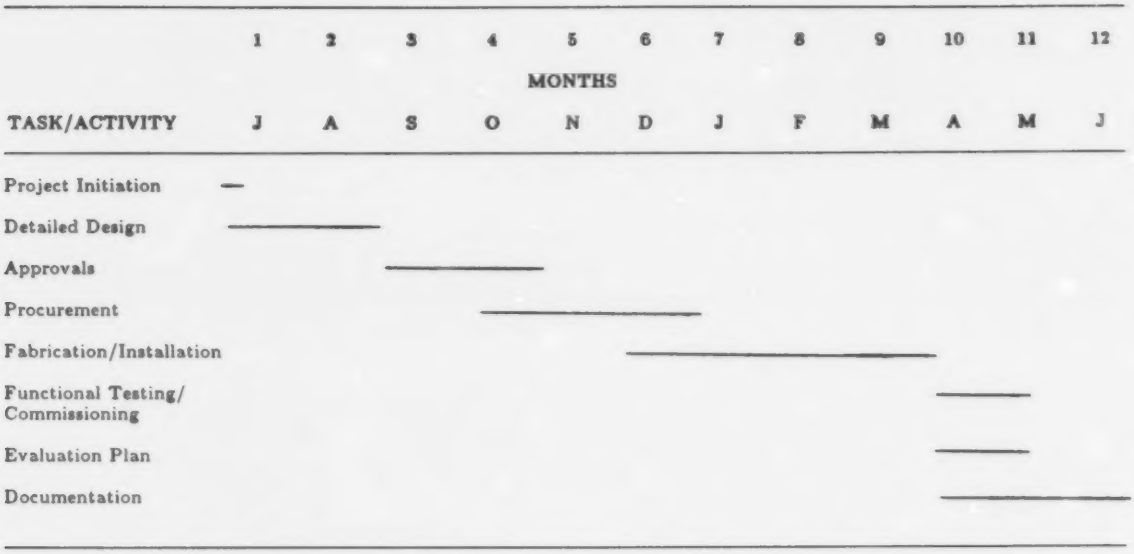


FIGURE 11.1 PROJECT SCHEDULE - PHASE II - DETAILED DESIGN/CONSTRUCTION

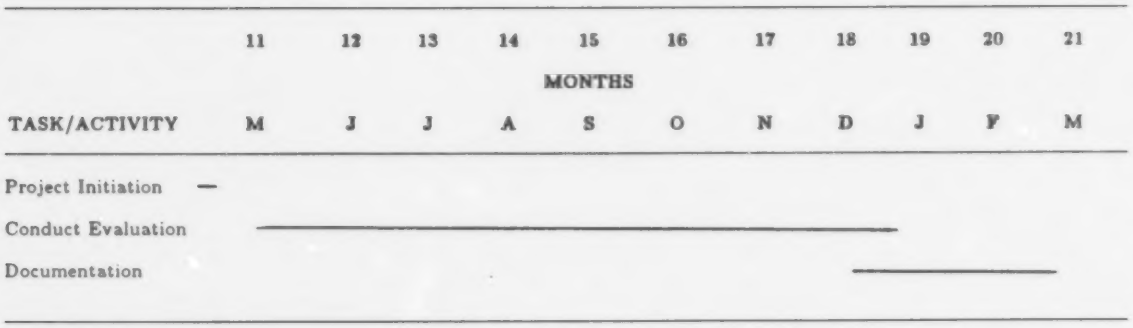


FIGURE 11.2 PROJECT SCHEDULE - PHASE III - EVALUATION

11.5 PROJECT TEAM

The proposed project team is the same as the one used for Phase I of the project. W.R. Davis Engineering Limited will manage the project and provide technical support in all of the areas including design, testing and evaluation. German and Milne Incorporated will provide naval and marine expertise and will be responsible for the detailed design and installation aspects. Qualified ergonomists (Humantech) will be consulted during different aspects of the project including the design and testing and will assist in the evaluation plan and while conducting the evaluation.

11.6 COSTS

The estimated costs to conduct Phases II and III of the project are as follows. Costs for performing the modifications and evaluation on both a single vessel and both vessels are included.

	ONE VESSEL	TWO VESSELS
Phase II	200,000	350,000
Phase III	29,000	35,000

A detailed cost proposal to perform the work is included under separate cover.

12.0 CONCLUSIONS AND RECOMMENDATIONS

12.1 CONCLUSIONS

The following conclusions are made with regard to the present study:

- At present there is no convenient method of transferring between decks on these vessels (Prince Edward & Prince Nova) for disabled persons.
- Three level change system concepts were developed to provide access for disabled persons.
- The shipboard elevator and wheelchair lift concept was selected based on total costs, operational and safety considerations, and suitability for disabled users and attendants.
- The shipboard facilities and ferry terminal facilities (Caribou and Wood Islands) all have some areas that present accessibility problems for disabled persons.

12.2 RECOMMENDATIONS

Based on the results of this phase of the work it is recommended that the shipboard elevator and wheelchair system be installed on the Prince Nova and Prince Edward. The system should normally be locked and operable by a shipboard attendant only. The system meets all of the established requirements. The following are also recommended for improving the level of accessibility for disabled persons on the ferries and at the terminals.

For the ferries:

- increase the width of the stairs wherever possible and decrease the slope to 45° or less with non-slip surfaces on the steps
- the colour of the stairs should be such that they are easily visible under relatively low light conditions
- redesign the washrooms and cafeteria to improve wheelchair access
- install coamings on interior and exterior side of outside doors. Coamings on interior doors should be removed.

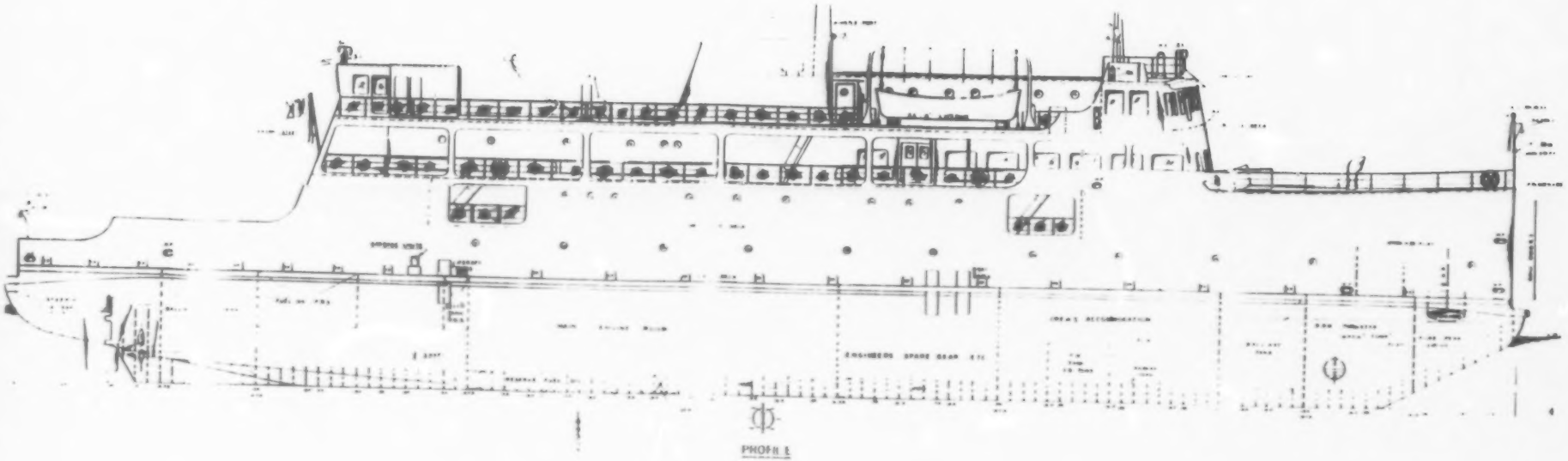
For the terminals:

- the entrance doors should be easier to open
- more space should be provided for wheelchair traffic in the cafeteria seating area
- accessibility to the gift shop and cafeteria at the Wood Islands terminal should be improved by adding ramps and/or wheelchair lifts.

APPENDIX A

PRINCE NOVA/EDWARD

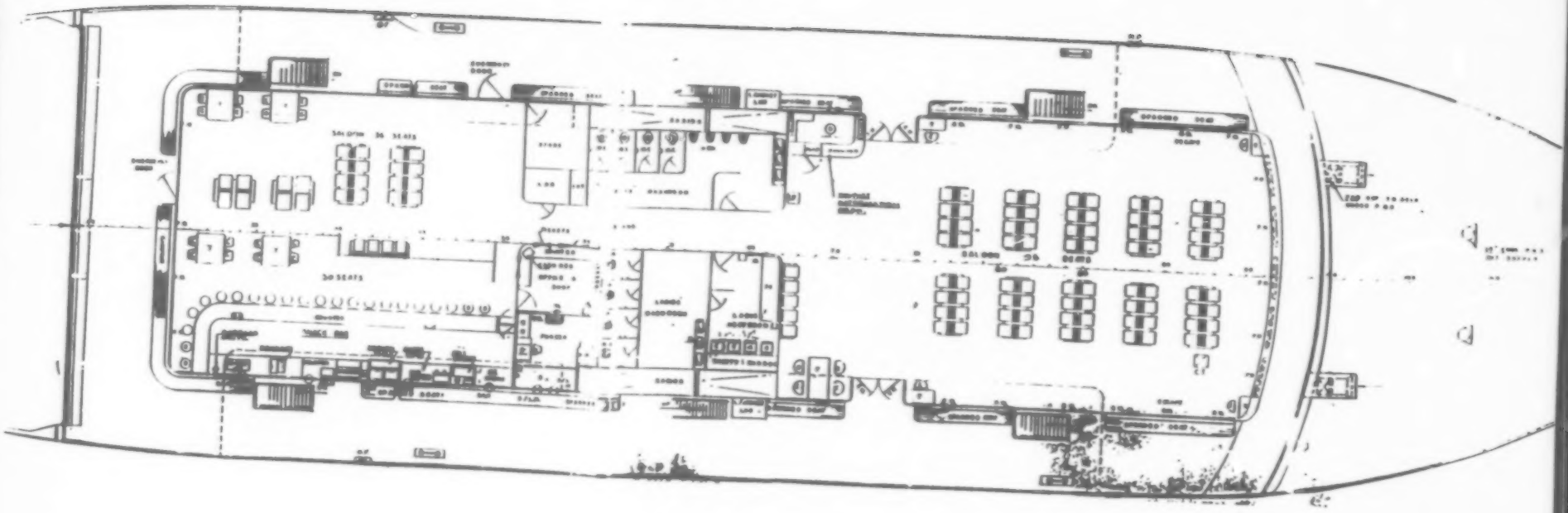
GENERAL ARRANGEMENT



PROFILE

A-2

PRINCE NOVA/EDWARD

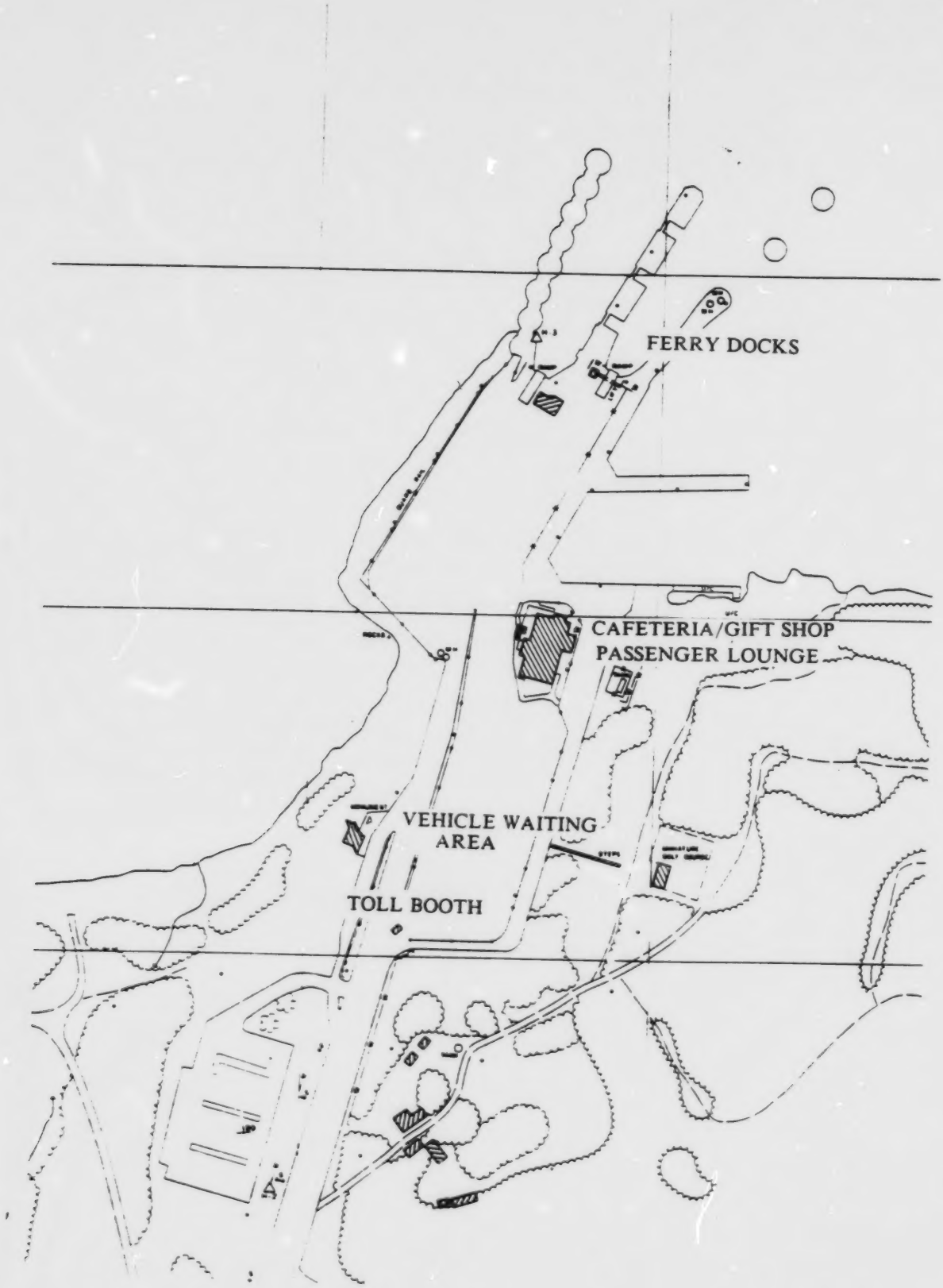


PROMENADE DECK
PRINCE NOVA/EDWARD

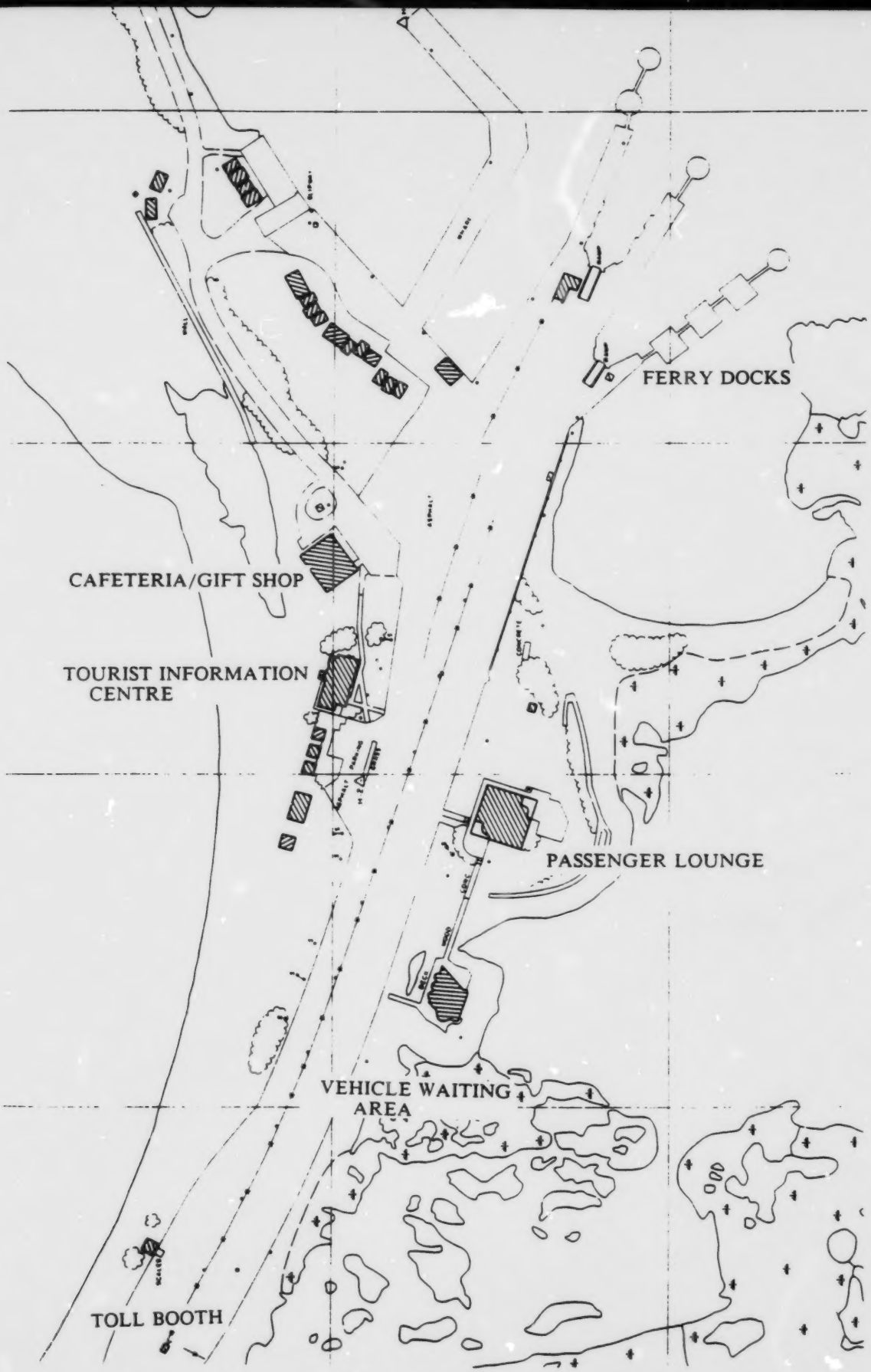
MAIN DECK

APPENDIX B

SIDE PLANS OF CARIBOU AND WOOD ISLANDS TERMINALS



CARIBOU TERMINAL B-2



WOOD ISLAND TERMINAL B-3

APPENDIX C

LEVEL CHANGE SYSTEM INFORMATION

ECONOL
STAIRWAY
LIFT CORP.

MFG. OF
ECONOL-LIFT
MODEL 500VL

Member of NAEC

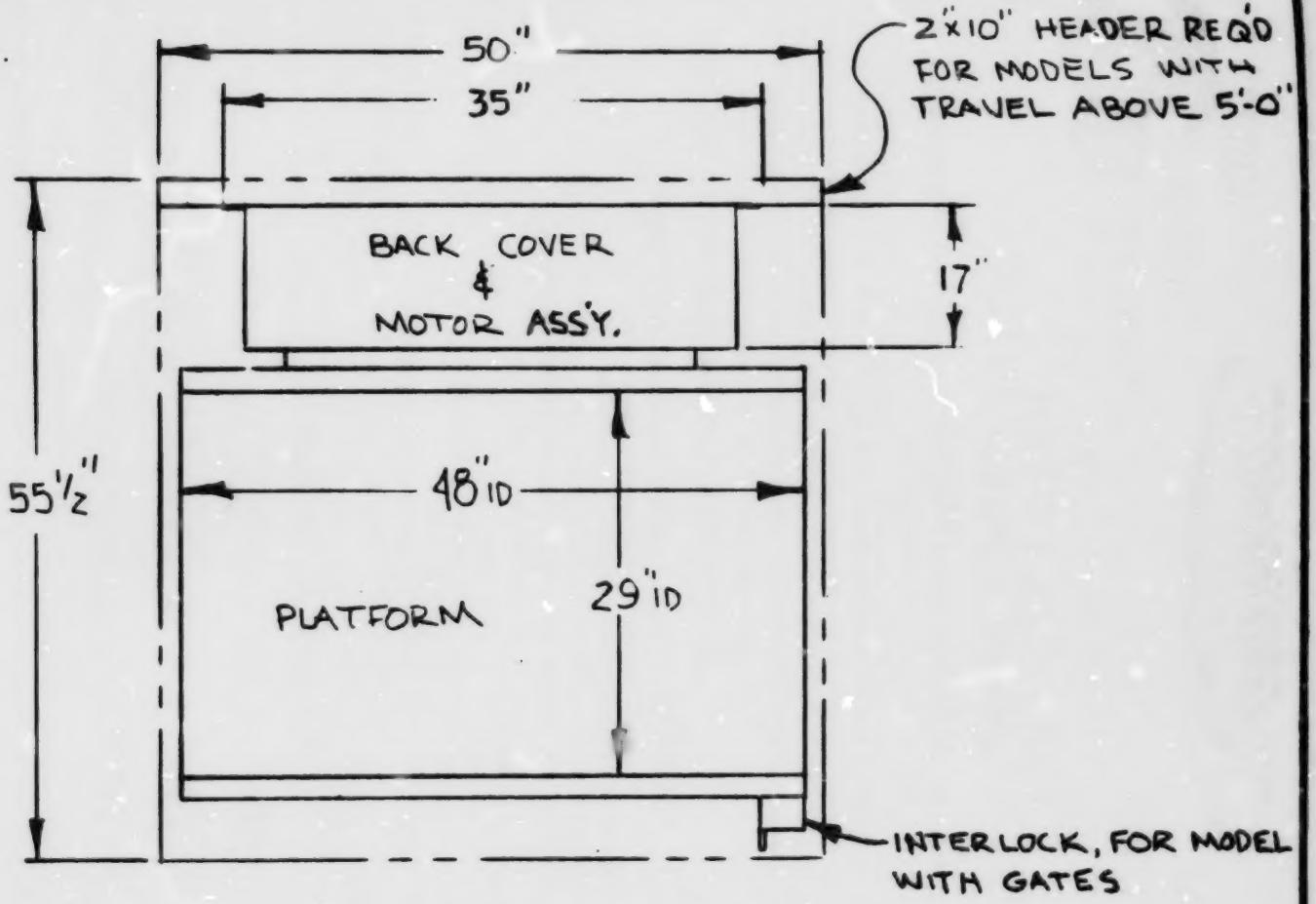
ECONOL VERTICAL WHEELCHAIR LIFTER

"Our years of experience brings you a lift built for year after year of dependable service"

MODEL VLO Shown Above

"Econol Products Built to Last!"

Shown Above MODEL VL with Plexiglass Enclosure



A 55½" x 50" space is required for proper running clearance. A 6" pit is req'd. for floor lever stop at lower landing.

4'0" measurement will be 3'10 ID when 2 gates are used. 4'0" measurement will be 3'11" ID when 1 gate is used.

ECONOL STAIRWAY LIFT CORP.

MFG. OF ECONO-LIFT MODEL 500VL

Member of NAEC

VERTICAL LIFTER
MODEL — 500 VL

Units Mini Lift 42, 48, and 60 are self supporting units for indoor use. They need only be fastened down at bottom to base or floor. Ramp on down side unless you have a 6" pit.

All other units are not self supporting and must be fastened to a supporting wall. If you wish any of these units weatherproofed refer to extras. This unit is a heavy duty, strongly built unit with top quality material. Models up to 60" usually have 2 shipping crates. Units over 60" usually come in three crates. In most states can only be used as a 2 stop. Buy Econol Lift Products for top quality equipment in this field. Refer to page 2 for space requirements.

MODEL					
Mini Lift 42	•	•	•		Travel up to 42"
Mini Lift 48	•	•	•		Travel up to 48"
Mini Lift 60	•	•	•		Travel up to 60"
VL 72	•	•	•	•	Travel up to 72"
VL 96	•	•	•	•	Travel up to 96"
VL 108	•	•	•	•	Travel up to 108"
VL 120	•	•	•	•	Travel up to 120"
VL 144	•	•	•	•	Travel up to 144"

INCLUDES THE FOLLOWING AS STANDARD EQUIPMENT

1. Platform safety diaphragm under platform
2. Automatic ramp on down side
3. Adjustable limit switches
4. Platform 29" x 48" ID
5. Constant pressure switch on platform
6. Enamel brown finish
7. 500# capacity
8. 1½ HP motor — Speed 25 F.P.M.
9. 42" high sides
10. 6# Electro-Mechanical brake
11. 2# 50 Roller chains having a tensile strenght of 5,600 lbs ea.

OPTIONAL EQUIPMENT

1. Gates — Top landing or platform with electro-mechanical interlock
2. Keyed call and send controls
3. Special color paint includes labor
4. Alarm bell
5. Emergency stop switch on platform
6. Grab rail
7. Hand held control
8. Flip seat on unit
9. 700# capacity
10. Hand crank lowering device
11. Presentation drawings or blue print
12. Public building instruction signs or plaques
13. 208 volt motor
14. Weather proof for outdoor use
15. Adjacent opening

42" high sides with 14" high automatic ramp on one end of platform. Lowered platform height is 4" to 6" from floor to pit. Platform is equipped with a device which, if the platform is obstructed in its downward travel by a force applied anywhere at its lower surface, will open an electric contact in the control circuit and thus stop the down travel of the platform within the range of 3".

Structure — The entire unit is constructed of high quality steel tubing with all joints welded and unit finished in brown paint. Weather proof housing protects all components giving durable, all weather performance. (For exterior installation)

Lifting Height — Up to 12 ft. If permitted by local code.

Control — 24 volt, constant pressure push button on platform and at each landing. Adjustable limit switches.

Gates — Now required on units in most states. They are electronical and mechanically interlocked. They are swing type and require 31" clearance to open.

ECONOL STAIRWAY LIFT CORP.

MFG OF ECONOL-LIFT MODEL 500VLO

Member of NAEC

OUTDOOR VERTICAL LIFTER

MODEL — 500VL0

This unit is self supporting for outdoor use. Place unit on a cement slab and fasten it down at the bottom. You will need a 6" pit if you want unit to stop level with floor. Otherwise unit will have ramp on down side. This unit is weather proofed, and has a hand crank to lower unit in case of emergency. No gates included, refer to extras under model 500VL. Shipped in approximately 2 crates. Car and unit. Unit will weigh approximately 1000-1200 lbs. This is not a flimsy built unit. Remember quality for quality you cannot buy a better unit. This unit can only be used as a 2 stop. Refer to page 2 for space requirements.

MODELS

Mini Lift 42 ..... Travel up to 42"
Mini Lift 48 ..... Travel up to 48"
Mini Lift 60 ..... Travel up to 60"

STANDARD EQUIPMENT

This model includes all the standard equipment as listed for the model 500VL however, this model is weather proofed and has a hand crank.

EXTRAS Refer to model 500VL

WARRANTY

One year warranty on defective materials. Warranty does not cover labor or service. As explained on warranty sheet. Parts returned evidencing defects in material and workmanship, must be returned transportation prepaid. Warranty card must be completed and on file at Econol Stairway Lift Corp. office.

Any alterations to unit without written authority by Econol Stairway Lift Corp., will make your warranty void.

Some state codes have a limited travel height for the vertical VL. Check your local state codes or call for information before ordering. Purchaser must obtain permits where required.

Units are manufactured to ANSI CODE PART XX Vertical Wheel Chair Lifts.

NEED A LIFT?

For more information about Econol's products

write or call:
MAIN FACTORY AND SALES OFFICE
ECONOL STAIRWAY LIFT CORP.
2513 Center St., Cedar Falls, Iowa 50613
Phone 319-277-4777

Your Local Home Sales Advisor:

Purchaser is responsible to obtain permits where required unless Econol has agreed to obtain permit in advance of purchase.

14el/LT

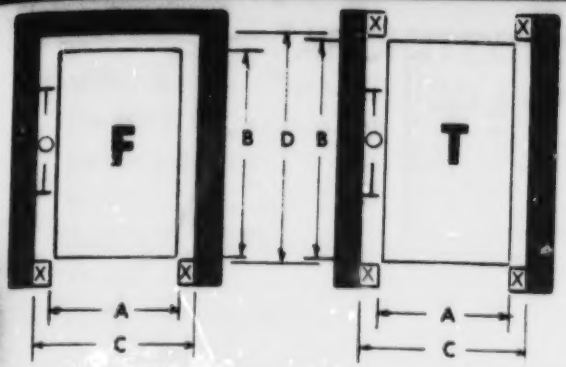
LIFTECH ELEVATOR COMPANY

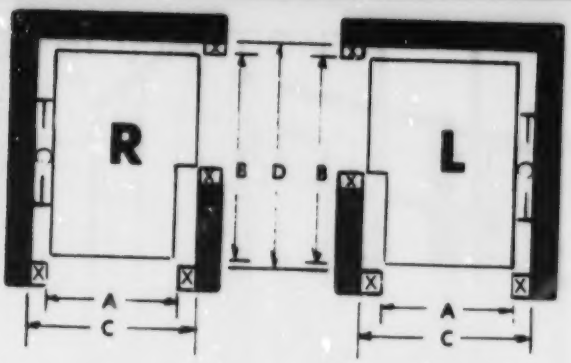
MANUFACTURER & DISTRIBUTOR OF:-

- WHEELCHAIR LIFTS
- PLATFORM LIFTS
- SPECIALTY LIFTS
- RESIDENTIAL ELEVATORS
- FREIGHT ELEVATORS
- DUMB WAITERS

FEATURES:-

- ECONOMICAL
- RELIABILITY
- LESS SPACE REQUIREMENTS
- FASTER DELIVERY
- EASY INSTALLATION
- VIRTUALLY MAINTENANCE FREE





WHEELCHAIR & PLATFORM LIFTS

WHEELCHAIR LIFTS

The LIFTECH wheelchair 'CAN-LIFT' is specifically designed to accomodate handicapped persons. Operating control buttons in the car and hall stations are lowered for the person in the wheelchair. The Interior of the car can be supplied to blend with the decor of the building. For quietness, economy and safety, a hydraulic jack and pump unit is used for the lift. The pump unit could be housed in a lockable metal enclosure at a remote location.

The 'CAN-LIFT' is ideally suited for schools, libraries, churches, institutions and other public buildings.

PLATFORM LIFTS

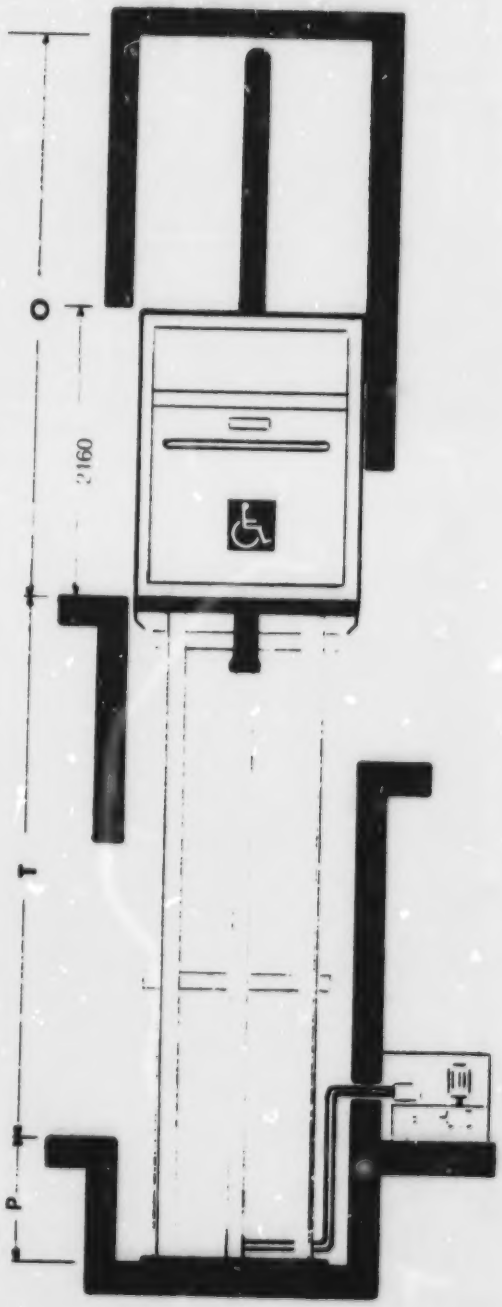
The LIFTECH platform lift is a very economical alternative to a freight elevator. It is especially suited for warehouses, deparment stores, and industrial plants.

The car is supported by a pair of cantilever slings which are attached to a hydraulic jack (holeless).

The pump unit could be enclosed in a lockable metal enclosure to eliminate the costly and space-consuming machine room which is mandatory for freight elevators.

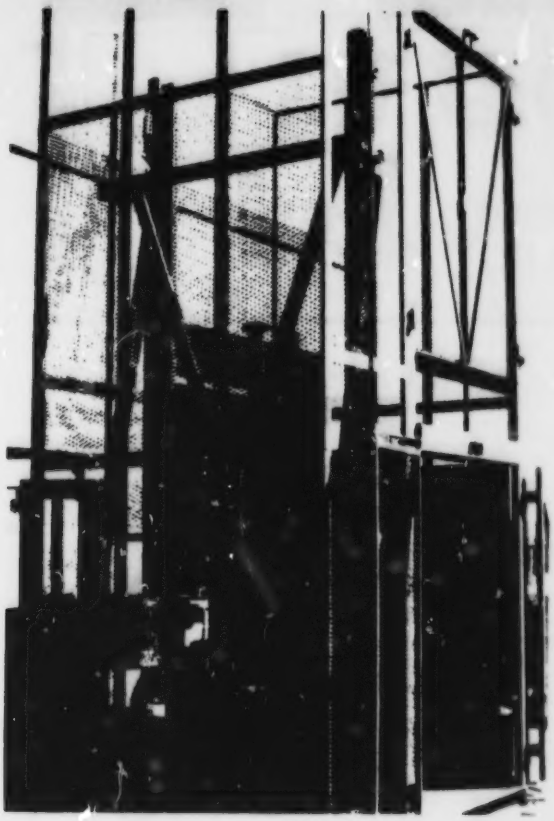
Hoistway doors are single or double swing doors, depending on the size.

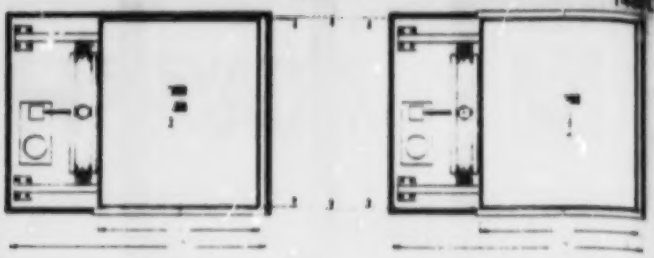
	MODEL	CAPACITY KG.	PLATFORM SIZE		HOISTWAY SIZE	
			A	B	C	D
WHEELCHAIR LIFTS	WF	250	915	1525	1335	1680
	WT	250	915	1525	1335	1555
	WL	250	915	1525	1335	1680
	WR	250	915	1525	1335	1680
PLATFORM LIFTS	PF-15	1500	1220	1830	1675	2000
	PT-15	1500	1220	1830	1675	1890
	PL-15	1500	1220	1830	1675	2000
	PR-15	1500	1220	1830	1675	2000
	PF-20	2000	1830	2440	2335	2600
	PT-20	2000	1830	2440	2335	2500
	PL-20	2000	1830	2440	2335	2600
	PR-20	2000	1830	2440	2335	2600



NOTES:

1. Maximum travel for wheelchair lifts is 7 m.
2. Maximum travel for platform lifts is 5 m.
3. Maximum car speed is 0.25 m/s.
4. Minimum overhead clearance for Standard cylinder 'O' = T + 600 - P.
5. Minimum overhead clearance for telescopic cylinder 'O' = T + 2 + 600 - P.
6. Minimum pit depth could be 150 mm.
7. Minimum clear height for car and entrance is 2000 mm.
8. Rough opening for entrance is dim. 'C' x 2160 mm.
9. ALL data is general. For specific and custom jobs, consult your local LIFTECH dealer for exact requirements.
10. ALL Specifications are in accordance with C.S.A. requirements.





FREIGHT PLATFORM LIFT

FREIGHT PLATFORM LIFT

It is the closest thing to a freight elevator but far behind in price. A total solution to a messy problem of material handling in warehouses and stores which are congested with old fashion conveyor systems. it takes less than half the space of a conveyor system.

EQUIPMENT

It is a modern, efficient and economical piece of equipment. It is totally pre-fabricated pre-wired and pre-piped unit, ready to be assembled anywhere in the building.

DRIVE UNIT

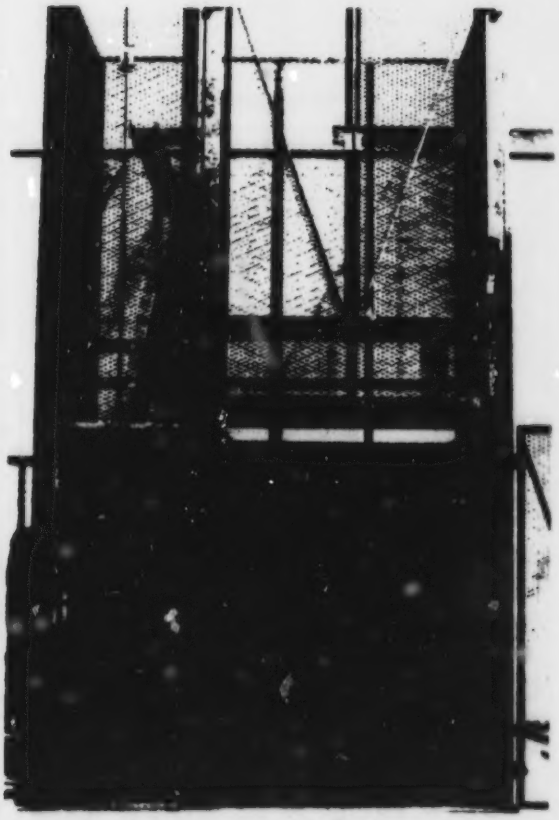
Drive unit is an integral part of the lift and is located behind the lifting mechanism, thus eliminating the need of machine room and reducing the installation time.

HOISTWAY ENCLOSURE.

Wiremesh enclosure is supplied (where permitted) with the lift including complete entrances and CSA approved double contact interlocks.

INSTALLATION:

It could be assembled anywhere in the building because it is not attached to the building at all. It stands FREE by itself head and shoulder above any lifting equipment.



MODEL	CAPACITY KG.	PLATFORM SIZE		HOISTWAY SIZE	
		A	B	C	D
FPF-9	900	1220	1780	2130	1830
FPT-9	900	1220	1780	2130	1830
FPF-13	1350	1525	1780	2440	1830
FPT-13	1350	1525	1780	2440	1830
FPF-18	1800	1525	2080	2440	2130
FPT-18	1800	1525	2080	2440	2130
FPF-22	2250	1525	2390	2440	2440
FPT-22	2250	1525	2390	2440	2440

NOTES:

1. Minimum pit depth shall be 305 mm.
2. Maximum car speed shall be 0.15 m/s.
3. Most suitable up to 4 m of travel.
4. Specifications are for reference only.
5. All specifications shall meet the requirements of applicable CSA codes.

*All dimensions in millimetres

ARCHITECTURAL SPECIFICATIONS

MODEL NO.: _____ APR 2 4 1986

CAPACITY: _____ kg.

HYDRAULIC JACK: ☐ STANDARD ☐ TELESCOPIC

TRAVEL: _____ mm

OVERHEAD CLEARANCE: _____ mm

SPEED: UP: _____ m/s DOWN _____ m/s

NUMBER OF ENTRANCES: F _____ R _____ S _____

PLATFORM SIZE: _____ mm X _____ mm

CLEAR HOISTWAY SIZE: _____ mm X _____ mm

PIT DEPTH: _____ mm

POWER SUPPLY AVAILABLE:

_____ VAC. _____ Phase _____ Hz.

EMERGENCY POWER FOR LIGHTING & LOWERING

- ☐ Available in the building
- ☐ Supplied by Liftech*

LANDING ENTRANCE: _____mm X _____mm, 1-1/2 hr. labelled fire door and frame assembly, including:-

- ☐ Three ball bearing hinges per door
- ☐ 75 mm x 625 mm Glass Lite
- ☐ 2 speed door closer
- ☐ 200 mm x 860 mm kick plate of 1 mm aluminum clear anodized finish.
- ☐ C.S.A. approved door interlock
- ☐ Key controlled operating buttons mounted in door frame
- ☐ Door lever handle ☐ Satin coat finish.
- ☐ Power operated door closer* ☐ Selective auto stop*
- ☐ Horizontal Sliding Door*

APPLICABLE C.S.A. CODE

☐ CAN 3-B355-M81 ☐ B-44-1975

CAR

_____ mm x _____ mm x _____ mm made of 20 mm x 30 mm x 3 mm silver finish anodized aluminum extrusion and 13 mm prefinished wood panels including:

- ☐ Non-skid surface platform
- ☐ Removable aluminum grid ceiling & light
- ☐ Toe guard on entrance side.
- ☐ 25 mm dia. chromed handrail
- ☐ Key controlled car station with emergency stop, mounted horizontally in the lower section of car panel.
- ☐ Auto-levelling with indicator light.
- ☐ Rubber matting or carpet* ☐ Telephone*
- ☐ Removable glass or mirror upper section of panels*
- ☐ Horizontal sliding car door*
- ☐ Deluxe car*

DRIVE UNIT

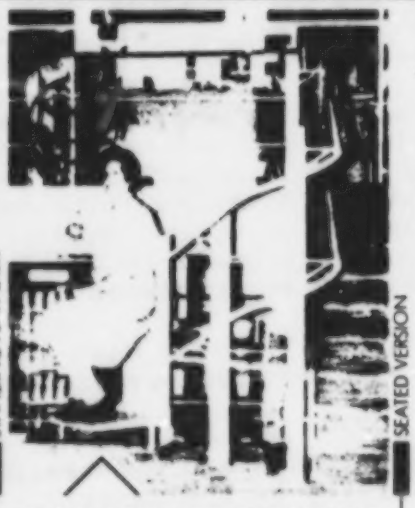
_____ gpm submersible pump is directly coupled to _____ H.P. 1750 r.p.m. ___ vac. ___ phase electric motor, including:

- ☐ Sound Isolation Coupling
- ☐ Modular designed elevator valve for slow start and slow stop in both directions.
- ☐ Built-in check, relief and manual lowering valve.
- ☐ Pressure gauge with isolation valve.
- ☐ Shut off valve.
- ☐ Non-Interference timer
- ☐ Lockable enclosure to eliminate the need of machine room*

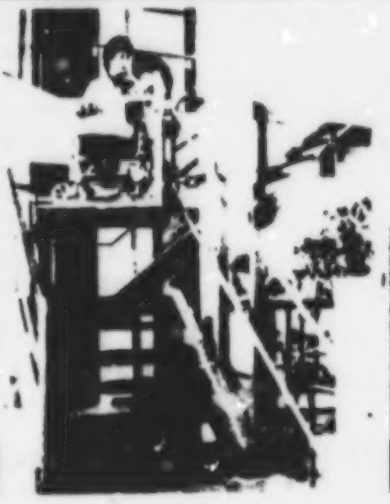
* Optional features

Designs and specifications are for reference only and are subject to change without notice.
For detailed specifications, custom designed elevators or lifts, consult your local dealer.

STANDING PLATFORM



SEATED VERSION



WHEELCHAIR PLATFORM

LIFTECH ELEVATOR COMPANY
20-1730 McPHERSON CRT.
P.O. BOX 307, PICKERING
ONTARIO, L1V 2R6
(416) 839-4770
TELEX 065-28140 CAN-INTEL PICK LIFTECH

FOR YOUR DEALER, PHONE COLLECT

euro lift B.V.
STAIRWAY LIFTS

ARCHITECTURAL SPECIFICATIONS

WHEELCHAIR LIFT

1. GENERAL

1.1 DESCRIPTION

1.1.1 General Requirements:
Division 1, General Requirements, is a part of this Section and shall apply as if repeated here.

1.1.2 Related Work Performed by Other Sections:

Section 02200:	Excavation and Backfilling for oil lines
Section 04200:	Unit Masonry
Section 05500:	Miscellaneous Metal
Section 09900:	Painting and Finishing
Division 16:	Feed wires to main line switches and circuit breakers, terminals of each panel, car lighting, circuit lighting, pit lighting and convenience outlets in machine room and pit; emergency alarm bell and communication connections.

1.2 DESCRIPTION OF ELEVATOR SYSTEMS:

1.2.1 Include under work of this Section the installation of the specified system complete with all machinery, motors, operating equipment, signals, cars, entrances and other accessories and interconnections required for full operation and control. The lift shall meet the requirements of the CSA Code CAN3-B355-M81 safety code for elevating devices for the handicapped.

1.3 REQUIREMENTS OF REGULATORY AGENCIES:

1.3.1 Fabricate and install work in compliance with applicable jurisdictional authorities.

1.3.2 Submit shop drawings and specifications to authorities as they require them, and make arrangements and payments for tests, inspections, permits and test certificates required by authorities to validate satisfactory installation of work. Conduct tests in presence of authority. Work shall include re-inspections and re-tests that may be requested by the authorities.

1.3.3 Make final inspection only when installation is complete, including hoistway enclosure and machine room.

1.3.4 Payment for operation and ownership licences will be the responsibility of the Owner.

1.4 SUBMITTALS

1.4.1 Submit shop drawings (4 Sets).
1.4.2 Additionally, submit shop drawings to jurisdictional authorities in manner they specify.

1.4.3 Ensure that shop drawings show complete layout of elevator equipment: location of machinery and apparatus; clearances, dimensions and construction to accommodate installation of elevator work; and loads to be carried by building structure.

1.4.4 Test Certificates:
Submit test certificates of approval issued by jurisdictional authorities.

1.4.5 Maintenance Instructions:
Submit maintenance instructions for incorporation in Project Data Book.

1.5 GUARANTEE & MAINTENANCE

1.5.1 Provide a guarantee for a period of 1 year to cover the repair or replacement of defective equipment or work that is permanent part of the installation. This guarantee shall not include the repair of defects, or replacement of any component made necessary by normal wear and tear or mis-use or neglect of the manufacturer's maintenance requirements.

1.5.2 Provide maintenance on the lift system described herein for a period of 3 months after completion of work and turning over to the owner. Renewals or repairs necessitated by negligence or misuse of the equipment or by any other reason shall not be the responsibility of supplier.

2. PRODUCT

2.1 LIFT MANUFACTURER: Liftech Elevator Company
751 McKay Road, Unit # 5
P.O. Box 307
Pickering, Ont. Canada. L1V 2R6
Tel.# (416) 683-4770
Fax.# (416) 683-4773

2.2 LIFT MODEL: ☐ WF ☐ WT ☐ WR ☐ WL

2.3 TYPE: WHEELCHAIR AND ATTENDANT PLATFORM LIFT TYPE C designed to accommodate and support one handicapped person sitting in a wheelchair or standing on the platform, accompanied by an attendant.

2.4 CAPACITY: ☐ 250 Kg. ☐ 450 Kg.

2.5 HYDRAULIC JACK: ☐ STANDARD ☐ TELESCOPIC

2.6 TRAVEL (T): _____ mm. (From Bottom floor to top floor)

2.7 OVERHEAD (O): _____ mm. (From Top floor to under side of ceiling.)

2.8 PIT DEPTH (P): _____ mm. (From Bottom floor to Pit floor minimum 150 mm.)

NOTE:
O = T + 650 - P (For Standard Jack)
O = T/2 + 650 - P (For 2-Stage Telescopic Jack)

2.9 SPEED: 0.15 m/s approximately.

2.10 NUMBER OF ENTR'S:
_____ Front, door swing _____
_____ Rear, door swing _____
_____ Side, door swing _____

2.11 PLATFORM SIZE: 915 mm. x 1525

2.12 CLEAR HOISTWAY: _____ mm. x _____ mm.
(Check Dimension Table)

2.13. POWER SUPPLY: _____ VAC _____ PHASE _____ HZ
Minimum 30 Amp. fused disconnect switch by electrical contractor.

.14 LIFT OPERATION

2.14.1 Access to Lift shall be controlled by a key switch. All operating devices shall be of constant pressure type push buttons. Car operating devices shall overide all hall operating devices.

2.14.2 Lift shall operate only if all the hoistway door or gates are closed and mechanically locked.

2.14.3 Direction buttons shall operate the lift in the selected direction. Lift shall stop if the push button is released.

2.14.4 Car shall stop and ring alarm bell when red emergency button in car is pressed.

2.14.5 Car shall automatically level to floor when it is in the levelling zone, provided push buttons are released.

2.14.6 Green indicator lights shall go-OFF when the car is in self levelling zone.

2.14.7 Up and Down limit switches shall stop the motion of car in the respective direction.

15. CAR ENCLOSURE:

2.15.1 Car enclosure shall be a minimum 915 mm. x 1575 mm. x 2032 mm. (height). Car panels shall be at least 13 mm. in thickness, enclosed all four sides by clear anodized aluminum channel extrusion 20 mm. x 30 mm. x 3 mm. Each car panel shall be reinforced by 1 1/2" x 1 1/2" x 1/8" steel angle at the back to provide proper rigidity.

2.15.2 Finish of plastic laminated panel shall be as selected by the Architect.

Sliced Red Oak.
Walnut.
Almond.
Silver Grey.
Beige.
Other. _____

2.15.3 Car operating controls shall be mounted on 1/8" stainless steel # 4 finish face plate and located at 1020 mm. high from the floor. Operating controls shall include:

2.15.3.1. Two position ON-OFF key switch with key removable in OFF position only. It shall be easy to operate (NO PUSH-PULL-TURN-SEQUENCE).

2.15.3.2. Two Mushroom head BLUE push-buttons with engraved arrow for direction (constant pressure type).

2.15.3.3. One emergency Mushroom head RED push-button. This button shall stop the car and ring bell for help when pushed in.

2.15.3.4. Indicator light which shall go OFF to indicate that automatic levelling zone circuit is activated.

2.15.4 Provide a chromed handrail and brackets with concealed fastenings at 835 mm. high from floor, along control side panel.

2.15.5 Provide removeable aluminum 1/2"x 1/2"x 1/2"grid ceiling panels as a car roof.

2.15.6 Provide slim type fluorescent light fixture which shall be surface mounted at the top of control side panel.

2.15.7 Provide slim line type telephone which shall be surface mounted next to operating controls and wired through travelling cable to controller for hook-up (optional).

2.15.8 Provide toe guard on each entrance of car of minimum 250 mm. x 915 mm. steel plate of 3.18 mm. thickness. Bottom edge of toe guard shall be bent 30 degrees away from hoistway wall.

2.16. CAR PLATFORM:

2.16.1 Fabricate car platform with a structural steel frame covered with non-skid steel floor plate of 3.18 mm. thickness.

2.16.2 Floor plate and toe guards shall be painted with brown enamel paint #E604.

2.16.3 Fabricate car platform with a structural steel frame covered with a minimum of 20 mm. thick plywood. Wood surface shall be covered with 5 mm. grooved rubber mat. Secure floor mat edges on entrance side with nose angle and five #8 flat head screws, (OPTIONAL).

2.17. LANDING ENTRANCE ASSEMBLY:

2.17.1 Provide WARNOCK HERSEY 1 1/2 hour fire rated single swing door assembly pre-wired satin coat finish and ready for installation in 8" block wall. Installation and painting shall be by general contractor

2.17.2 Inside surface of door and frame shall be flush and shall be no more than 15 mm. from platform edge when installed.

2.17.3 Provide C.S.A. approved door interlock G.A.L. type M, which shall prevent operation of driving machine by normal operating buttons, unless the landing door closed and locked. It shall also prevent from opening of door unless platform is within 50 mm. from floor level.

2.17.4 Door shall be supported by three heavy duty ball bearing hinges

2.17.5 Provide two speed door closer, requiring a maximum force of 40N to open.

2.17.6 Door shall be provided with 6 mm. Georgian wired glass. Maximum glass area shall not exceed 645 cm (100 in) width of vision panel shall not be less 75 mm.

2.17.7 Provide 200 mm. wide kick plate of 1 mm. thick aluminum with clear anodized finish and shall be installed on inside surface of the door with minimum of 14 - 1/8 rivits.

2.17.8 Door assembly shall be provided with UL approved Schelage lever -thumb-turn latch-set. Thumb operator shall be of recess mounting type.

2.17.9 Hall operating controls shall be mounted on 1/8" stainless steel #4 finish face plate and shall be located at 1020 mm. high from the floor. Operating control shall include:

2.17.9.1 Two position ON-OFF key switch with key removeable in OFF position only. It shall be easy to operate (NO PUSH-PULL-TURN SEQUENCE).

2.17.9.2 Two mushroom head BLUE push buttons with engraved arrow for direction (constant pressure type).

2.17.9.3 Indicator light which shall go OFF to indicate that automatic levelling zone circuit is activated.

.18. HYDRAULIC JACK:

2.18.1 The Jack unit for the lift shall be of sufficient size to lift the gross loads to the height specified. The jack unit shall be designed and constructed in accordance with the applicable requirements of CSA code CAN3-B44-M85. It shall be factory tested to ensure adequate strength and no leakage. No brittle material, such as grey cast iron or semi-steel shall be used in the jack consturction.

2.18.2 The Jack unit shall consist of the following parts:

2.18.2.1 Plunger of heavy seamless steel tubing accurately turned and polished. A stop ring shall be electrically welded to plunger to positively prevent plunger leaving its casting. Oil line connection 1/2 NPT shall be provided at the bottom of plunger.

2.18.2.2 Cylinger shall be made of steel tubing of 3/16" minimum wall thickness. Cylinder to be sealed by low friction lip seal and guided at the gland with two glass filled nylon wear rings. A wiper ring shall be provided in the gland to clean the plunger as it enters into cylinder. Cylinder shall be provided with a bleed screw to bleed air from the system. A 7" square steel plate of 3/4" thick shall be welded to cylinder to support car sling, which shall be bolted on top of support plate by four 1/2 grade bolts. Rubber washers shall be used to isolate car sling from support plate to reduce vibration noise.

2.18.3 The Jack unit shall be installed perfect plumb and must operate freely with a minimum of friction.

2.18.4 Provide oil supply line from pump unit to jack with minimum number of bands. Hydraulic tubing of minimum 1/2" size shall be used.

2.19. PUMP UNIT

2.19.1 The pump unit for the lift shall be compactly and neatly designed with all the items listed hereinafter combined in a self contained unit. A submerged type screw pump coupled to externally mounted electric motor; oil reservoir; oil fill strainer with air filter; oil temperature/level gauge; hydraulic control unit with built in check valve, relief valve, up, start/stop valve, solenoid operated-down valve; automatic closing manual lowering valve; pressure gauge with isolating fitting; and line shut-off valve.

2.19.2 Hydraulic Pump shall be of pulsation-free low noise, positive displacement type screw pump. It shall be submerged in oil and coupled to electric motor by flexible coupling and C-Flange. Pump shall be equipped with inlet suction filter, to prevent from foreign materials getting into the system.

2.19.3 Electric Motor shall be 25% over rated to lift the load at speed specified herein before.

2.19.4 Oil Reservoir shall be of sheet steel welded construction provided with tight fitting steel cover, protected and filtered vent opening, an oil level/temperature right gauge and a drain plug. Reservoir shall have a capacity equal to the volume of oil required to reach the top landing plus a reserve of not less than 150 mm. above pump inlet port.

2.19.5 HYDRAULIC CONTROL UNIT shall consist of following components, all built into a single assembly. All adjustments shall be externally accessible without removing from the assembly.

2.19.5.1 Check Valve shall be designed to close quietly without permitting any perceptible reverse flow. It shall be designed to support the lift on a positive locked column of oil when car is at rest.

2.19.5.2 Relief Valve shall be externally adjustable with sealable cap, capable of by-passing the total oil flow without increasing back pressure more than 10% above the required to barely open the valve.

2.19.5.3 Up Start/Stop Valve shall be externally adjustable, and shall be designed to by-pass oil flow during initial start of motor-pump assembly. The valve shall close slowly, gradually diverting oil flow to the jack unit insuring smooth up-start and to reduce load on the motor during starting. It shall have built in de-acceleration feature to provide smooth up-stop when motor-pump assembly stops.

2.19.5.4 Solenoid Operated Down Value shall be externally adjustable for smooth start for down-speed as specified herein before. It shall have built in de-acceleration feature to smooth down-stop when solenoid is de-energized.

2.19.5.5 Manual Lowering Valve shall be designed for manually lowering of lift at the controlled speed (Not to exceed normal down speed) in the event of a power failure It shall automatically return to closed position when released.

2.19.5.6 Self-Cleaning Filter shall be provided to prevent foreign materials lodging in the control valve.

2.19.6 Hydraulic Pressure Gauge shall be provided complete with isolating needle valve, for setting relief pressure.

2.19.7 Shut-Off Valve shall be designed for isolating oil in the power unit reservoir to ensure ease of servicing and setting relief pressure. It shall have a pressure rating of minimum 1000 PSI (maximum pressure generated by pump).

.20. CONTROLLER

2.20.1 Electric controller shall be of constant pressure operation type, with silver to silver contacts on all relays and contactors. Thermal overload relay shall be provided to protect the motor against overloading. All components required for proper operation of lift as specified in operation section herein, shall be neatly mounted and wired and completely enclosed in a cabinet designed for mounting on pump unit, or on wall. All components shall be CSA approved.

2.20.2 Two main line contactors shall be provided to avoid the possibility of the pump churning if one contactor should fail.

2.20.3 Non Interference Timer shall be provided to allow passengers to disembark from lift safely by making all hall pushbutton stations nonoperational for a minimum of 10 seconds, (Time considered to be adequate for a passenger to remove key from car station and open landing door).

2.21. EMERGENCY POWER FOR LIGHTING & LOWERING (OPTIONAL)

2.21.1 Emergency power pack shall come into operation automatically upon failure of normal power supply. It shall provide electrical power for the following items to remain operational.
(A) Alarm Bell
(B) Emergency light in Car
(C) Controls for Down Direction

2.22. GUIDE RAIL & BRACKETS

2.22.1 Standard Elevator T-Rails of 12 kg/m weight shall be used for guiding car.

2.22.2 Rail brackets shall be of 1/2" x 3" steel flat bar and through bolted to solid 8" concrete block by two 1/2" Grade 5 threaded rod with back plates, washers and nuts.

2.22.3 Rail brackets shall securely hold the guide rails in a plumb and straight position regardless of car loading.

2.22.4 Swivel type guide shoes shall be provided complete with nylon inserts for smooth guiding of car.

2.23. SIGNS

2.23.1 Provide and install signs required by code B-355 and jurisdictional authorities.

: EXECUTION

3.1 EXAMINATION

3.1.1 Take critical site dimensions to ensure that tolerances and clearances to other constructions have been maintained, and so that necessary adjustments are made to adapt work of this Section during its fabrication and installation.

3.1.2 Ensure that anchors, inserts, pockets, bearings, services, and similar provisions, installed by others, are adequate to meet specified requirements, and make adjustments before installation.

3.1.3 Do not proceed with work of this Section until site conditions and work on which it depends are satisfactory within limitations of adjustment.

3.2 PREPARATION

3.2.1 Ensure that construction and service requirements for work of this Section which is to be performed under work of other Sections are explicitly communicated to the Contractor by drawings, diagrams, engineering data sheets and special instructions before the work concerned commences. Construction requirements shall include, but not be restricted to, locations of machines, operating devices, apparatus, services and accessories; structural members, framing,loadings, hoistway and pit dimensions; guide rail and sill supports, cutting and patching; access for installation of work; holes in pit, machine floors, walls and other construction and temporary protection.

3.2.2 Assist or supervise the location and installation of work preparatory to work of this Section as may be required by those performing the preparatory work. Provide necessary templates.

3.3 INSTALLATION

3.3.1 Install all components of the elevator system that are specified in this Section to be provided, furnished supplied and similarly included in the work, and that are required by jurisdictional authorities, to ensure that each system is completely functioning.

3.3.2 Install work of this Section only by specialist elevator mechanics employed by and under direct supervision of the elevator manufacturer.

3.3.3 Ensure that elevator operation is free of vibration and

sideways movement of car, and that it functions smoothly and quietly in all its parts.

3.3.4 Install for elevator system the materials and equipment required for transmission of power within the system, and the control devices required for it to function as specified.

3.3.5 Machinery and Equipment:
Include anchor bolts, other setting materials and layouts for anchorage of elevator machinery.

3.3.6 Install machinery and incorporate sound and vibration dampeners and isolators of specific design as required to eliminate tangible sound and vibration transmission through building.

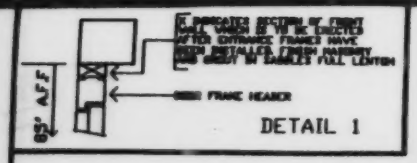
3.3.7 Install guide rails plumb within 1/8", together with brackets, under work of this Section.

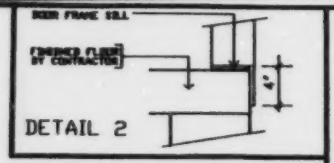
3.3.8 Hoistway Entrances:
Install entrances plumbed one over the other in hoistway.

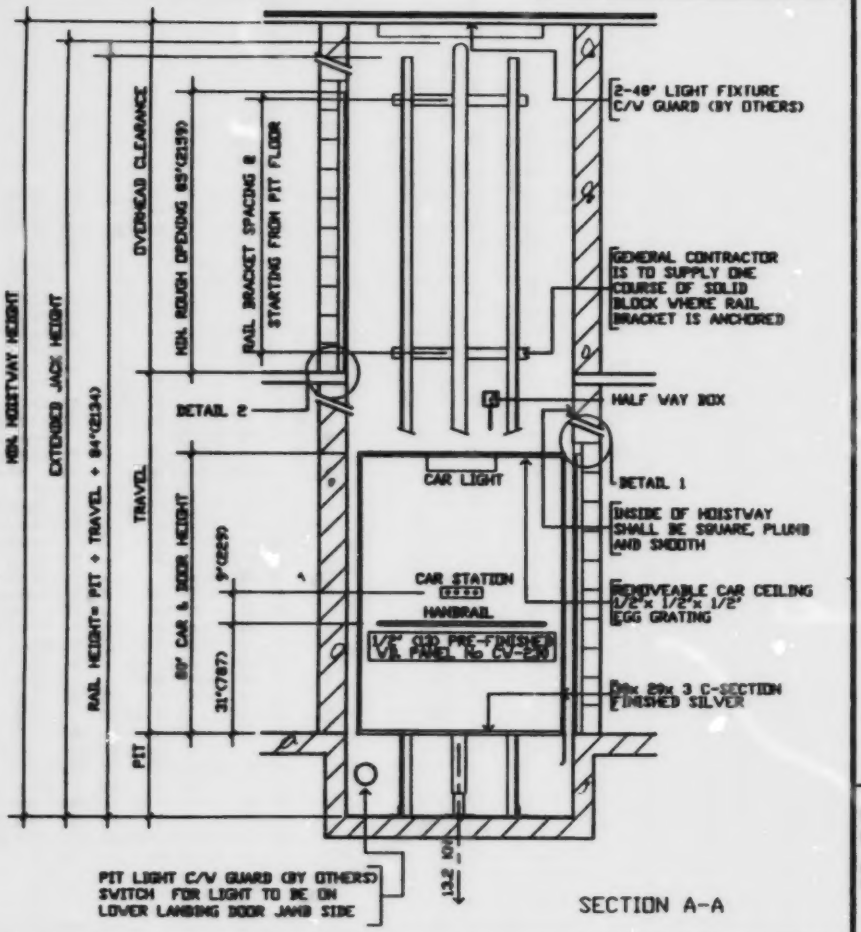
3.3.9 Electric Wiring:
Install electric wiring required to connect all parts of the equipment within each system to conform to the reference standard or to meet requirements of jurisdictional authorities whichever is more stringent.

3.3.10 Finishing:
Retouch damaged prime paint on surfaces which were shop painted.

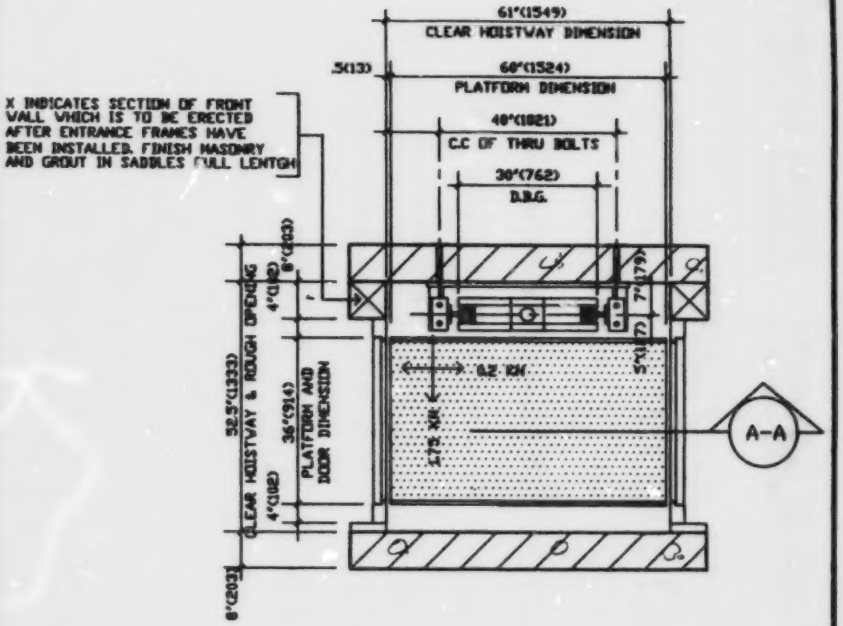
--- END ---






2-48" LIGHT FIXTURE C/V GUARD (BY OTHERS)
GENERAL CONTRACTOR IS TO SUPPLY ONE COURSE OF SOLID BLOCK WHERE RAIL BRACKET IS ANCHORED
HALF WAY BOX
DETAIL 1
INSIDE OF HOISTWAY SHALL BE SQUARE, PLUMB AND SMOOTH
REMOVEABLE CAR CEILING 1/2" x 1/2" x 1/2" EGG GRATING
CAR LIGHT
CAR STATION
HANDRAIL
1/8" GSD PRE-FINISHED VA PANEL No CV-SW
20w x 20x 3 C-SECTION FINISHED SILVER
DETAIL 2
MIN. HOISTWAY HEIGHT
EXTENDED JACK HEIGHT
OVERHEAD CLEARANCE
RAIL HEIGHT= PIT + TRAVEL + 84"(2134)
TRAVEL
MIN. ROUGH OPENING 83"(2159)
RAIL BRACKET SPACING @ STARTING FROM PIT FLOOR
80" CAR & DOOR HEIGHT
9"(229)
31"(787)
PIT
PIT LIGHT C/V GUARD (BY OTHERS) SWITCH FOR LIGHT TO BE ON LOWER LANDING DOOR JAMB SIDE
132 MIN

SECTION A-A



PLAN VIEW

METRIC DIMENSIONS ARE INDICATED IN BRACKETS

LEFT HAND DOOR REQ'D. _____

RIGHT HAND DOOR REQ'D. _____

NOTE - DOOR FRAME ASSEMBLY IS SUITABLE FOR MASONRY WALL ONLY

LIFTECH [redacted]
(416) 683-4770

GENERAL LAYOUT OF HANDICAP LIFT-

LIFTECH ELEVATOR COMPANY
751 McKAY ROAD, UNIT 87, P.O. BOX 307
PICKERING, ONTARIO L1V 2R6
(416) 683-4770

ARCHITECTURAL SPECIFICATIONS

STAIR LIFT

1. GENERAL

1.1 General Requirements

1. Comply with requirements of Division 1.

1.2 Related Work

1. Masonry: Section 04200
2. Electrical power: Division 16

1.3 Quality Assurance

1. Regulatory requirements: Carry out work in accordance with applicable codes and regulations. Arrange and pay for all required tests and inspections.
2. Installer's qualifications: Installation shall be carried out by manufacturer's forces.

1.4 Submittals

1. Submit detailed shop drawings. Show configuration, materials, anchorage methods, finishes, equipment and electrical connections and controls.
2. Submit shop drawings to jurisdictional authorities, required by them, prior to Consultant's final review.
3. Submit samples of colours and finishes of exposed surfaces.
4. Submit maintenance and operating data for inclusion into maintenance data book specified in section 01300.

1.5 Operating Instructions

1. Upon completion of work and after all inspection and testing has taken place and installation has been approved, a qualified manufacturer's representative shall visit the site and instruct Owner's designated person in the proper operation of the stair lift.

2. PRODUCTS

2.1 Description

Electrically operated, worm and ball driven wheelchair platform stair lift manufactured by:

Liftech Elevator Company
751 McKay Road, Unit 5,
P.O. Box 307,
PICKERING, Ontario.
L1V 2R6.

Telephone: (416) 683-4770
Fax: (416) 683-4773

LIFTECH ELEVATOR COMPANY
751 McKAY ROAD, UNIT 87, P.O. BOX 307
PICKERING, ONTARIO L1V 2R6
(416) 683-4770

2.1 PRODUCT - Cont'd.

1. Model No: _____
2. Travel: _____
3. Number of Landings: _____
4. No. of 90 Turns: _____
5. No. of 180 Turns: _____
6. Overhead Clearance: _____
7. Capacity: 180 Kg.
8. Speed: 0.10 meter/second
9. Platform Size: 700 mm X 1100 mm
10. Clear Stairway Size: 975/38" min.
11. Power Supply: 220 / 3 / 60
12. Motor: 1 H.P., 1750 RPM, 220/3/60
13. Take necessary site measurements for proper fabrication of work. Assume complete responsibility for their accuracy and completeness. Notify Consultant of any modifications required in building construction or dimensions to accommodate work at earliest possible date. If such notification is not made, it will be assumed the manufacturer is satisfied with construction provided.
14. All wiring and electrical interconnections shall comply with the governing codes.
15. Unless specifically indicated otherwise, provide manufacturer's standard equipment, construction and finishes.

2.2 Carriage

1. Provide electrically operated push button controlled folding platform.
2. Ramps, with non-slip top surface, shall lock in upright position, mechanically and electrically interlocked, opening only at designated landings. Lift shall not operate unless ramps are in the "up" position.
3. Ramps shall be touch-sensitive and stop lift if wheelchair rolls against them or if obstruction is encountered while travelling.

LIFTECH ELEVATOR COMPANY
751 McKAY ROAD, UNIT #7, P.O. BOX 307
PICKERING, ONTARIO L1V 2R6
(416) 683-4770

2.2 Carriage - Cont'd.

4. Provide touch-sensitive plate under platform stopping lift if obstruction is encountered.

5. Carriage side panel shall contain operating controls and plug in jacks for remote hand held controls.

2.3 Guide Rails

1. Guide rails shall be made of 2" diameter D.O.M. tubing containing concealed steel balls. Platform carriage is attached to steel balls with two 1/2" diameter high strength bolts.

2.4 Drive System

1. Platform is lifted up and down with a unique drive mechanism consisting of reduction gear, worm and steel bearing balls. A guide rail system (2" tube) is completely filled with steel balls, which are being pushed by worm. Inherent safety feature of this drive system is that car is moved mechanically and positively by steel balls, and there is no chance of free fall which is common with the cable drive system. Platform carriage is attached to steel balls with two 1/2" diameter high strength bolts.

2.5 Safeties

1. Provide manufacturers standard safety features including:

    1. Final terminal stopping devices (upper and lower landings).

    2. Ramp safety switches under platform plate.

    3. Drive machine enclosure safety switch.

2.6 Operation

1. Provide two control panels, with stainless steel face plates, one at the upper and one at the lower landing in location directed by Consultant.

2. Control station shall contain a push button, key controlled, with which platform (fold up position) can be called.

3. When platform is unfolded all control panel buttons shall be rendered inoperative, giving full control of lift to passenger or attendant.

4. Platform control panel shall contain a key operated on/off switch, emergency stop button, directional control switch and jack for attendant operation.

LIFTECH ELEVATOR COMPANY
761 McKAY ROAD, UNIT 87, P.O. BOX 307
PICKERING, ONTARIO L1V 2R6
(416) 683-4770

2.6 Operation - Cont'd.

5. Provide constant pressure switches to open and close both ramps, reachable from on or off platform.

6. All operating controls shall be 24 Volts.

7. Provide prominently displayed operating instructions.

2.7 Finishes

1. All exposed steel surfaces shall be finished with a two-component urethane coating system in a colour selected by the Consultant; colour not necessarily manufacturer's standard.

2. All other surfaces: manufacturer's standard finish.

3 EXECUTION

3.1 Examination

1. Examine existing conditions to ensure that they are satisfactory.

2. Start of work shall imply acceptance of conditions.

3.2 Installation

1. Install components in required locations and securely anchor to supporting work so that they will not work loose under expected operating conditions.

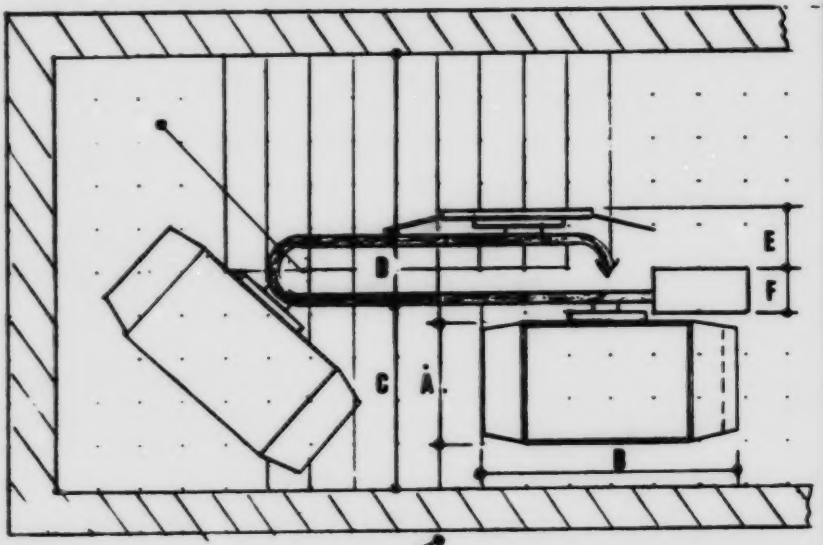
2. Provide all parts, items, components, wiring, connections to make a fully operational system.

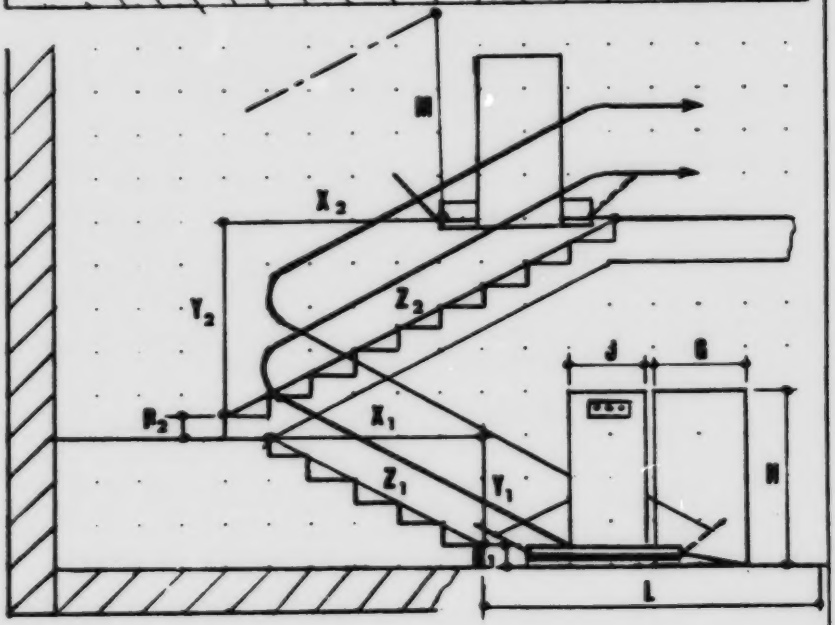
3. Clean all exposed surfaces. Touch up minor surface damage with matching paint. Replace components which, in the opinion of the Consultant, cannot be satisfactorily repaired.

LIFTECH ELEVATOR COMPANY
751 McKAY ROAD, UNIT 87, P.O. BOX 307
PICKERING, ONTARIO L1V 2R6
(416) 683-4770
FAX 0416/683-4773

#	UL-1	UL-2
A	685	685
B	1100	915
C	1070	1000
D	460	460
E	350	350
F	305	305
G	610	610
H	1070	1070
J	610	610
L	2000	2000
M	2000	2000

X_1		
X_2		
X_3		
Y_1		
Y_2		
Y_3		
Z_1		
Z_2		
Z_3		
R_1		
R_2		
R_3		





UNI-LIFT

BOGHA S. VIRK, P.ENG

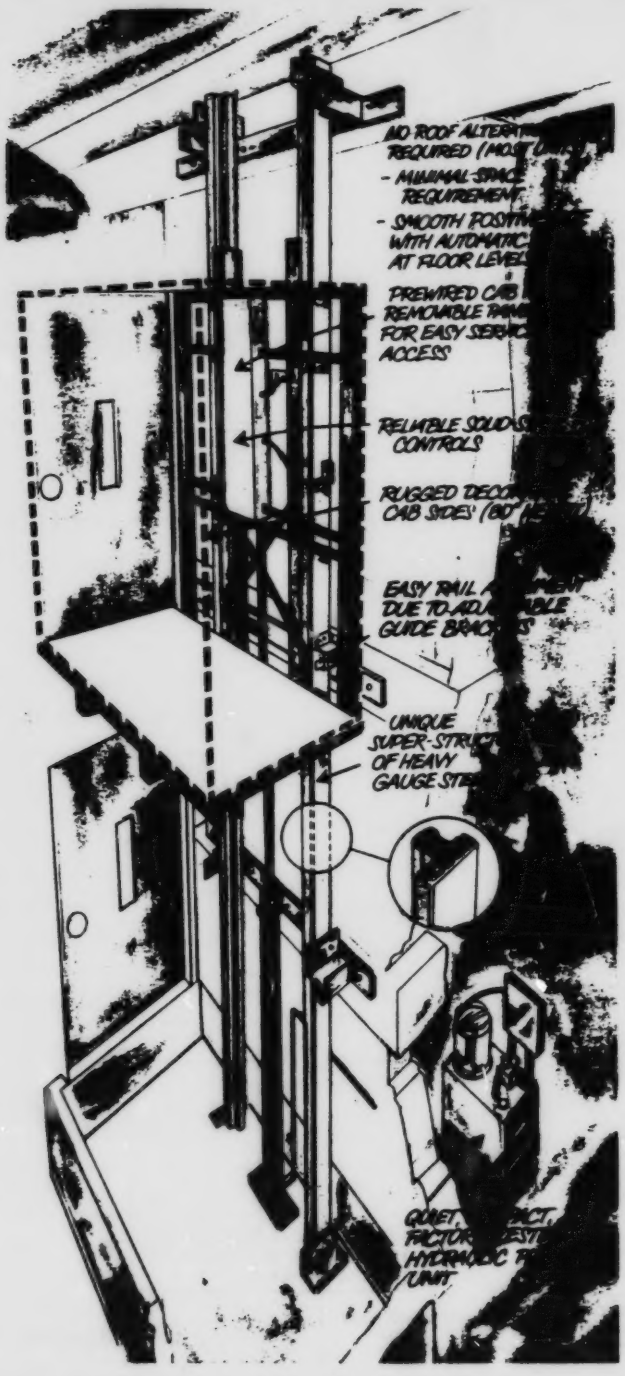
DATE

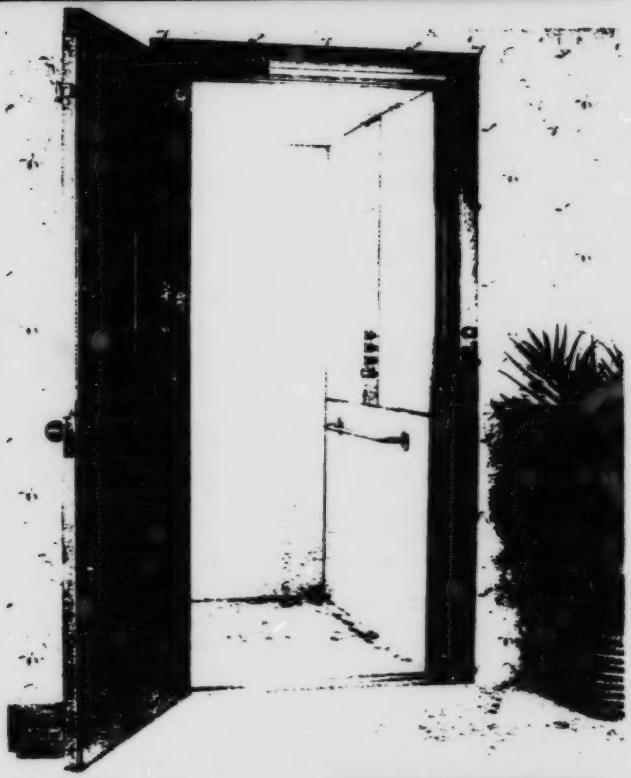
CONCORD

ELEVATOR INC.

PROLIFT™

THE ELEVATING SOLUTION FOR BARRIER-FREE ACCESS


NO ROOF ALTERATION REQUIRED
- MINIMAL SPACE REQUIREMENT
- SMOOTH POSITIVE WITH AUTOMATIC AT FLOOR LEVEL
PREWIRED CAB REMOVABLE PANEL FOR EASY SERVICE ACCESS
RELIABLE SOLID-STATE CONTROLS
RUGGED DECORATIVE CAB SIDES
EASY RAIL ALIGNMENT DUE TO ADJUSTABLE GUIDE BRACKETS
UNIQUE SUPER-STRUCTURE OF HEAVY GAUGE STEEL
QUIET, COMPACT, FRICTION-FREE HYDRAULIC POWER UNIT



Concord Elevator's new PROLIFT™ is built for continuous, reliable performance, incorporating the structural strength of the building with dependable, hydraulic power, heavy-gauge steel construction, and solid state electronics. Engineered for up to 7 meters of travel, the PROLIFT™ can quietly and efficiently serve from 2 to 6 staggered landings. Concord Elevator's PROLIFT™ is manufactured to the exacting standards of the elevator industry, provides a lifetime of dependable service. Meets or exceeds C.S.A. B-355 safety standards for elevating devices.

PROLIFT™ FEATURES

Proven Technology Made Affordable

CONCORD'S Special Elevating Devices are the affordable solution to today's barrier-free access requirements of multi-level public buildings.

Developed in conjunction with the International Year of the Handicapped. This rugged dependable unit meets the demand for low cost vertical transportation for the handicapped.

The PROLIFT™ incorporates proven elevator technology — a direct-plunger, hydraulic-powered cab that travels on elevator guide rails securely attached to the building structure. At the same time, the PROLIFT™ offers simplicity and economy for vertical traffic: minimal pit depth and overhead clearance; easy installation with only single phase power required.

The PROLIFT™ is manufactured to surpass the exacting standards of the elevator industry, provides a lifetime of dependable service. Our pre-engineered package can be easily installed in only five working days.

Cost-efficient Features

- Minimal space allocation
- Needs no roof alterations*
- Load bearing on pit floor
- Optional location of compact hydraulic power unit
- Requires minimum pit — just 300 mm*

*Most units

The special hoistway entrance system includes the "flush-inside" design, full 915 x 2030 mm door complete with vision panel, two-speed closer for ease of entry, plus easy-operation "mushroom head" call button.

Designed for Safety

Based upon European designs of passenger elevators that have been in use for decades, the PROLIFT™ system incorporates smooth flush hoistway and special "flush inside" entrance-ways to create a "safe zone" in which the gateless cab travels. The open-end cab design is ideally suited to those using mobility aids and wheelchairs. Traveling at 0.15 m/s, this smooth-riding cab permits safe, comfortable barrier-free access from grade level.

Large "mushroom" head push button controls are mounted at accessible level for easy operation.

Outstanding Cab Components

Ease of operation, safety, and attractive maintenance-free appearance are the guiding principles behind the PROLIFT™ design.

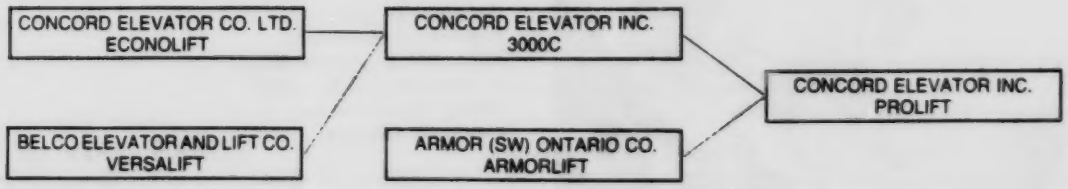
- Complete range of cab size configurations, custom cabs available
- Heavy-gauge, structural steel cab frame
- Soft fluorescent lighting for full illumination
- Solid-state in-cab controls
- Spacious 2030 mm sidewalls — with ceiling
- Attractive choice of melamine interior panels
- Large vertical stainless steel cab station
- Easy-operation "mushroom head" push button controls
- Emergency alarm and lighting
- Skid-resistant checkplate floor for durability
- Removable panels for ease of access of all serviceable components

Safe, quiet, and dependable hydraulic power supplied by a compact, easily located, power unit.

Concord's other safe operation elements

- Key-controlled, constant pressure operation
- Anti-creep mechanism
- Approved electrical/mechanical interlocks (GAL type M)
- Emergency lowering valve in machine room
- Downspeed-limiting flow control valve
- Emergency battery power supply to operate lift in down direction

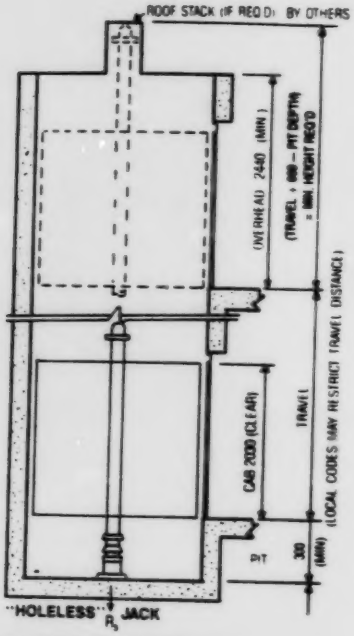
PRODUCT EVOLUTION



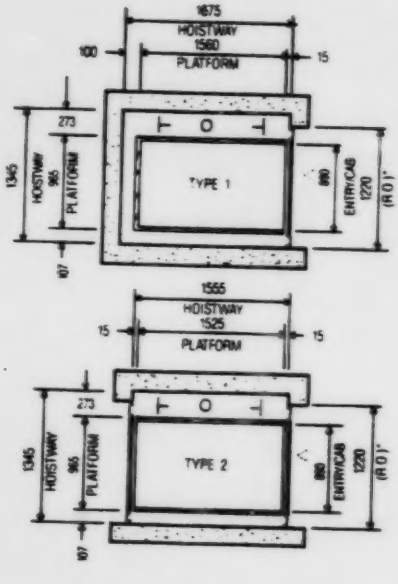
CONCORD'S STANDARD DESIGN LAYOUTS

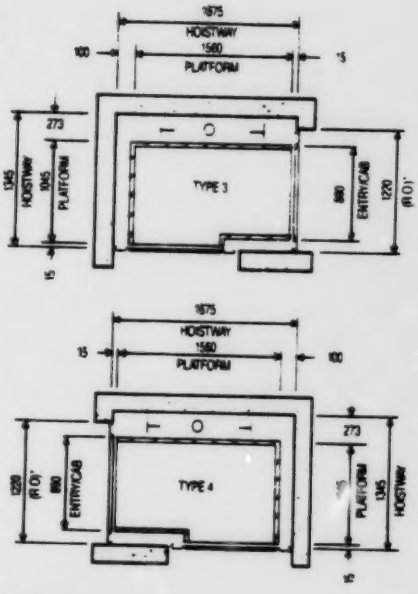
14420/CE

LAYOUTS FOR STANDARD SIZES SHOWN "VARIOUS MODELS & SIZES AVAILABLE"



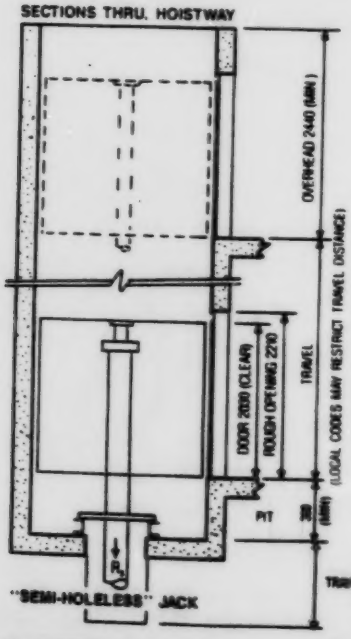
HOISTWAY PLANS

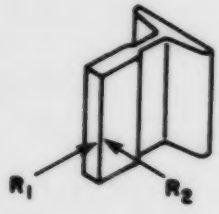




△ NOMINAL SIZE
* ROUGH OPENING (MIN.)
(REFER TO SHOP DRAWINGS)

SECTIONS THRU. HOISTWAY





Approximate Reactions		
R_1	R_2	R_3
kN 0,66	kN 1,78	kN 16,2

N.B. CONCORD'S PROGRAM OF PRODUCT IMPROVEMENT IS CONTINUOUS, AND WE RESERVE THE RIGHT TO MODIFY SPECIFICATIONS WITHOUT NOTICE.

For a complete booklet of specifications and design data, please contact your authorized distributor.

STANDARD SPECIFICATIONS

General Specifications

Landing Entrances (Doors)

Complete entrance assembly to carry a fire label from CUL/ULC certifying it has been tested and approved for minimum fire separation of 1 hr.

The landing entrance shall be supplied as an integral unit prewired, zinc wipe coated and ready for installation on the site. Each integral landing entrance shall have the following equipment included and mounted:

2 speed adjustable hydraulic closer

3 sets heavy duty ball bearing hinges and plates

Door vision panel approximately 100 x 600 mm of clear wired glass (or to max permitted by fire label)

Approved interlock to maintain the door in a closed and locked position when the lift platform is not at the landing. Interlock shall be provided with an electric contact which will interrupt the power to the control mechanism if the door is in the open position or not securely closed and locked.

Door to be 915 x 2030 mm (subject to site limitations), swing type.

Door to be equipped with a labelled latch set.

The door locking mechanism (beak) shall be of the hidden mounting type fastened to a reinforcement plate on interior of the leading edge of the swing door. It shall be mounted at least 1980 mm from the door bottom.

The opening (landing) control shall consist of a call button and key switch and suitably marked as to its function. The key shall be removable only in the OFF position. Button wiring enclosure to be on the inside of the frame and to completely enclose button wiring when plate is in position.

Pumping Unit & Control

The pumping unit and control shall be integrally mounted. The control enclosure shall be mounted on the pump unit frame and be prewired and tested prior to shipment. Control circuitry to be solid state and located in car control station enclosure. The pump unit control valve shall be a unit type which includes all hydraulic control valving inherently. This valve shall incorporate the following features:

Up direction acceleration speed adjustment for a smooth start.

Down direction valve opening speed adjustment for a smooth start. Smooth stops at each landing shall be an inherent feature of the valve.

Other inherent features of the unit valve shall be:

1) adjustable pressure relief valve
2) manually operable down valve to lower lift in the event of an emergency
3) Pressure gauge indicating in BARS psi
4) Pressure gauge isolating valve manually operable
5) Gate valve to isolate cylinder from pump unit
6) Adjustable flow control valve to set maximum down direction speed
7) Electrical solenoid for down direction control

The pump unit shall be of the submersible type for quiet operation.

Cab Enclosure

The cab clear platform shall be a minimum 890 x 1525 mm with enclosed sides at least 2030 mm high. Cab enclosure shall be bolted together to form a rigid, plumb and square assembly to accept 13 mm cladboard panels trimmed with stainless steel.

The cab enclosure shall also incorporate the following as standard features:

Emergency lights to automatically operate in the event of a power failure.

Audible alarm to operate when STOP button is pressed.

Alarm to remain operational in the event of a failure in the normal building power supply.

Terminal limit switches, auto-releveling assembly and alarm to be mounted on the cab sling and be pre-wired to the cab operating panel wiring enclosure.

Cab shall have removable panels for ease of access of all servicable components from inside the cab enclosure.

Limit and levelling swithches shall be behind the removable cab walls for a vandal resistant location.

Key switch and stop button to be pre-assembled, mounted and pre-wired to the cab wiring enclosure.

Travelling cable to be pre-wired to cab wiring enclosure. To prevent interference with the persons using the lift, the cab key switch, when activated, will prevent the hall buttons from operating.

The cab platform shall be constructed of steel frame and at least 3 mm checkerplate as a non-skid floor surface (or approved alternative).

The cab platform and sling shall be of steel cantilever designed and securely bolted together plumb and square.

All cab components shall be bolted and not welded for ease of repair or removal.

Guides and Brackets

Guide brackets shall be of steel and securely fastened to the building structure.

Brackets shall securely hold the guides in a plumb and straight position regardless of cab loading.

Guides shall be bolted through the hoistway enclosure with back-up plates, washers and nuts. This may be altered with approval of the architect.

Jack Unit (Holeless or Semi-holeless)

The plunger shall be fastened to the cab sling by means of bolts or pins.

The cylinder shall be equipped with an oil drain release, an air release and a packing head incorporating a substantial stop collar. The piston shall be supplied with a steel stop ring which will prevent the plunger from leaving the cylinder.

General

Meets or exceeds CSA B-355 safety standards for elevating devices.

The lift shall be installed by qualified workmen skilled in their trade.

Drawings to be prepared using good drafting procedures and shall be submitted to the Architect and or customer for approval prior to installation.

The lift shall generally be of good appearance with quality materials used throughout.

The car speed shall be max 0.15 m/s in both directions while carrying rated load.

The minimum capacity shall be 250 kg.

Over 7 metres of travel is available, but is subject to local authorities approval.

Guarantee

The lift contractor shall provide three (3) months free service from date of approval by local authorities. The entire lift and all component parts shall carry a one (1) year guarantee. The guarantee shall be for the replacement, at no cost of defective parts but shall not include the labour costs required to replace the defective part or parts.

Options Available

1) Concord Elevator has available a synchronized telescopic style piston unit. This is especially designed for jobsite locations where a roof stack or hole is needed but inadvisable.
2) Emergency lowering power supply to operate the lift in the down direction in the event of failure in the normal building power supply. This is in addition to the Emergency Manual lowering valve mounted on the pump unit **(Now Standard Equipment)**
3) Non-interference timer in control panel **(Now Standard Equipment)**
4) Telephone enclosure in cab
5) Low pressure sensor in hydraulic line
6) Automatic control for residence elevators
7) Folding car gates
8) Doors clad one side exterior only in stainless steel or painted to your specifications
9) One to two ratio cable over hydraulic piston units, for reaching higher heights at lower costs
10) Oak handrails
11) Modulift option - anodized aluminum cab frame with plexiglas panels

Customer Provisions

1) The machine room and hoistway provided by the owner/agent must be in accordance with elevator lift safety codes, local building codes, fire regulations and hydro codes.
2) Permanent power to a lockable fuse or cartridge type disconnect switch is to be provided by the owner/agent in the machine room to be located as per elevator drawings.
3) A plumb hoistway is to be provided by others. Due to close running clearances the owner/agent must assure that the hoistway is constructed plumb, square and to exact sizes shown per elevator drawings. Drywalling and or parging between floors may be needed if exact hoistway measurements to drawings are not met.
4) Rough openings in the hoistway to be left for entrance frames to be installed. Entrance frames are to be erected after the elevator is installed. The frames are secured in exact location to meet code for close running clearances. Finish grouting, drywalling and masonry around the frames is the responsibility of owner/agent.

TM - Concord Elevator Inc. has trade marked PROLIFT

CONCORD ELEVATOR INC
A MEDIQUIP HEALTHCARE COMPANY

Head Office
625 Rowntree Dairy Rd
Woodbridge, Ontario
L4L 5T9
416-856-3030
Fax 416-851-6556

Branch Office
337 Consortium Court
London, Ontario
N6E 2S8
519-681-3311
Fax 519-681-3494

Distributor

Printed in Canada

Robertson Custom Elevators

Controlled Access Lifts...

Robertson Custom Elevators has a complete line of Controlled Access Lifts to meet every application. The C-500 Series is designed for a wheelchair plus attendant.

Each model features our patented and CSA approved elevator interlock. It was developed specifically for Controlled Access Lifts and Residential applications. In addition to meeting all Elevator Code requirements, it has several important features:

- Door lock is released electrically, and only for a pre-determined cycle (up to 18 sec.) when the car is at a landing.
- Normally locked door prevents unwanted intrusion into the car, greatly reducing nuisance and vandalism. A very desirable feature for public, unattended locations such as schools.
- Door/interlock combination ULC labelled without use of manual latch, resulting in easier access for the wheelchair-bound.
- Door lock can be used with wood doors and frames, at reduced cost, where building codes permit.

HYDRAULIC LIFTS

MODEL C-500-H

Two sizes are offered, the C-500 for wheelchair plus an attendant, the C-400-H for wheelchair only. (3 or 2 persons standing respectively.) Both models use a compact cylinder and pump system.

Pit requirements depend on choice of cylinder, total travel and overhead clearance. An 8" (200 mm) minimum pit is required.

Minimum overhead clearance is 92" (2340 mm)

C-500-H SPECIFICATIONS

The lift is a cantilever design supported by only one shaft wall which must resist a 250 pound (113.4 kg) pullout force. The pit floor must withstand a 2500 pound (1135 kg) shockload.

Lifting Method

Lifting is by means of a single stage inverted holeless cylinder; or two or three stage synchronous up-right cylinder. Choice of lifting method will depend upon total travel and total shaft height available. Two or three stage cylinders allow greater travel and/or reduced pit and overhead. Piston and cylinder diameters vary with length of travel and rated load. (Typical 2.5" (64 mm) x 3" (76 mm). Piston or Cylinder is anchored to the pit floor by means of a locating plate and to the car by a positive attachment to the car sling.

Rated Speed

Variable up to 50 feet (15 m) per minute.

Capacity

Up to 1100 pounds (500 kg)

Pump

Pump flow rate and motor horse power varies with size of cylinder required, rated speed and maximum load. (Typical is 4 G.P.M. (19 L.P.M. and 2 H.P.)

All pumps are equipped with up and down acceleration damping, and running speed adjustments. By-pass valve is set to maximum load. A manual lowering valve is included on the pump.

Controls

Main controller supplied in 16" x 20" x 4" (410 x 510 x 100 mm) cabinet which may be surface mounted or recessed.

Key switch at landing calls car and electrically releases door. Car has constant pressure floor selecting buttons, door release and emergency buttons (door release timed for ease of access). Non-interference timer isolates car from landings allowing safe egress.

Car Enclosure

Cab made of decorative melamine finished panels 80" (2030 mm) high, trimmed with stainless steel edge and corner moldings and 6" (150 mm) kick plate. Brushed stainless car button plate, and one chrome handrail complete the cab finishes. Cab ceiling is egg crate louvre. Cab is easily dismantled for repair or removal.

A two lamp fluorescent fixture is mounted to the carriage and illuminates the cab indirectly through the ceiling. Emergency lighting (2 lamps) is automatically energized in the event of power failure. (An alarm bell mounted outside the shaft is also activated.)

Car Size

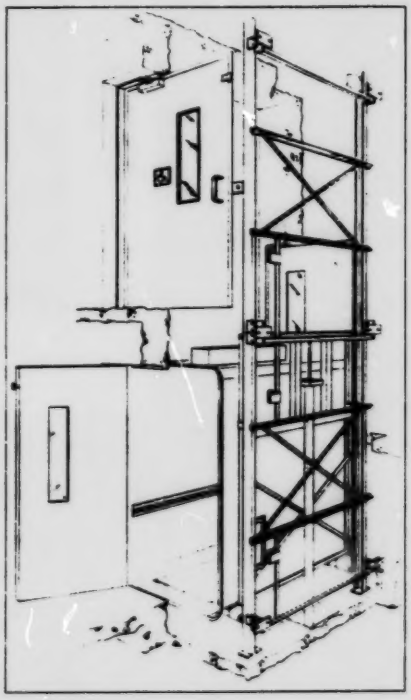
36"W x 60"L x 80"H
(915 x 1525 x 2030 mm)

Other cab sizes can be provided, subject to code limitations on minimum dimensions and maximum area.

Landing Doors and Frames

U.L.C. labelled doors, 3/4 or 1 1/2 hour rated are supplied complete with CSA approved interlock fitted in frame; two speed hydraulic closer, heavy duty hinges; pull handle, and georgian wire vision panel.

Where allowed by building design, solid core wood doors may be used at lower overall cost. Interlock by Robertson Custom Elevators, door and hardware by owner.



Power Supply

240V 1 PH or 208V 3 PH is supplied to a fused disconnect at the controller location by the owner.

24V emergency power supply by Robertson Custom Elevators.

Machine Room

A machine room is required for the 12" x 24" x 36" (300 x 610 x 910 mm) pump unit. Alternately, pump and controller may be housed in a locked cabinet adjacent to the shaft.

MODEL C-400-H

A free standing Type C lift of cantilever design for interior and protected exterior use. Can serve up to 8 feet 2500 mm) rise where no floor is to be penetrated.

Lifting Method

Single or two stage hydraulic cylinder

Rated Speed

12 feet (3.7 m) per minute

Capacity

400 pounds (180 kg)

Car Enclosure

Melamine panels inserted in a painted steel frame. A chrome handrail is provided. Steel platform with non-skid surface

Car Size

32" W x 50" L (800 x 1320 mm)

Landing Doors and Lift Enclosures

[illegible] minimum height gate(s) must be supplied at the top landing.

A 42" (1070 mm) min. gate is required at the top landing. Enclosure and door/gate can be supplied with the lift (painted steel panels) or as part of the building.

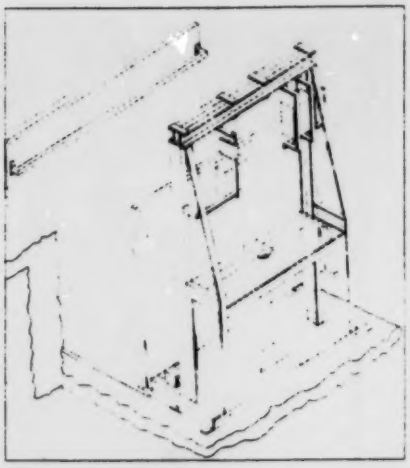
Controls

Main controller supplied in 16" x 20" x 4" (410 x 510 x 100 mm) cabinet. Key switches at landing calls car and electrically releases doors/gate. Car key switched for security, has constant pressure floor selecting buttons, door releases and emergency buttons. (Door release timed for ease of access). Non-interference timer isolates car from landings.

Power Supply

240V 1 PH supplied to a fused disconnect at the controller location by the owner.

24V emergency power supply by Robertson Custom Elevators

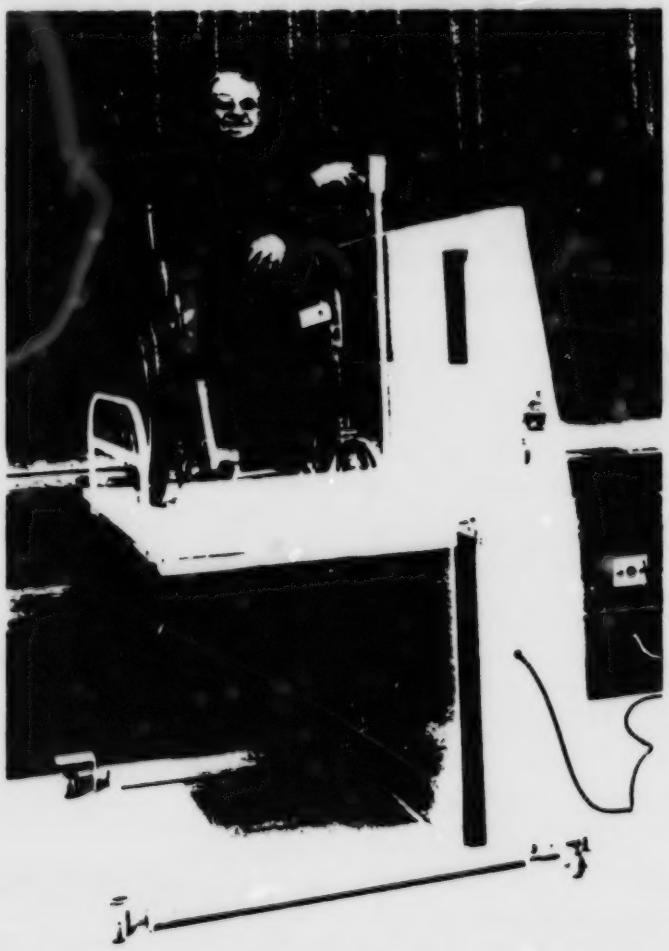


MOBILE PATFORM LIFT

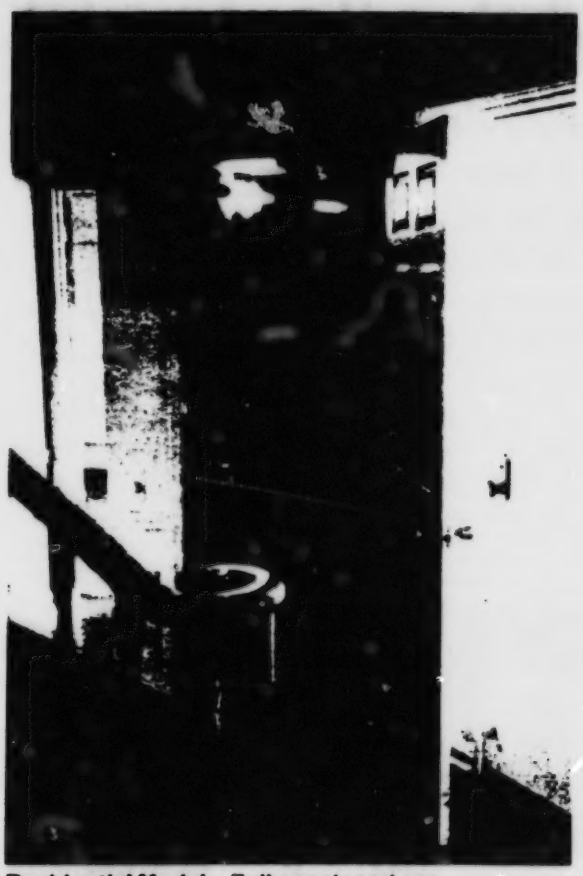
The ideal answer for situations where wheelchair access is required occasionally. The unit is easily put aside when not in use. Auditorium floor to stage access is just one possible application. Units are currently in use in schools, nursing homes, hospitals and universities.

Features:

- Constant pressure directional toggle switch on platform
- Call send control at lower level for attendant
- Controls key locked for security
- Rises up to 60"
- Automatic adjustable stops, top and bottom
- Plug in 110V power requirement
- Safe 24V controls
- Moves easily on 3" caster wheels
- Easily dismantled if required to pass through normal doorways
- Licencing not required



Residential Lifts...



Residential Model – Fully enclosed car

For Luxury Homes

Fully automatic private residential elevators, custom designed for the available space, and needs of the client. A wide range of assistive features and appointments can be included.

The 550 pound capacity, hydraulic piston and cable drive is smooth and quiet, while being very compact. A 50" (1270 mm) x 50" (1270 mm) shaft size is required for a spacious 36" (910 mm) x 48" (1220 mm) car. This drive requires a shallow 6" (150 mm) pit, and only 96" (2240 mm) above the landing.

Controls feature momentary touch buttons, emergency lighting, and emergency lowering from the car. (See also photo on cover.)

RESIDENTIAL MODEL **MODEL L-550-A**

Capacity
550 pound (250 kg), 3 persons

Lifting Method
Two cables acted on by hydraulic cylinder for 2:1 lift advantage

Pump
Positive displacement with 5, 10 or 20 gallon (23, 46 or 92 L) tank, driven by 1 to 5 HP motor depending on speed

Rated Speed
Variable up to 60 feet per minute (18 m per min.)

Controls
Momentary touch, lighted car and landing buttons in stainless or brass plates. In-car emergency lowering available (car will return to 1st level and stop)

Car
Size 36" x 48" (900 x 1220 mm) or to fit. Birch veneer plywood with handrail and lighting standard. Owner's choice of finishes can be accommodated, with certain restrictions on weight added.

Landing Doors and Frames
Solid wood core doors by owner, to Robertson Custom Elevators detail. CSA approved door interlocks field fitted during installation.

Power Supply
240V 1 PH or 208V 3 PH supplied to controller location by owner. Supply to be on a separate circuit or fused disconnect. 24V emergency power supply by Robertson Custom Elevators if specified.

Machine Room
None required as such. However, space for a 12" x 24" x 36" (300 x 610 x 910 mm) pump unit must be designated.

Other Products

- **Long Lifts**
  The ideal solution where access to several levels is needed, including a stop at the outdoor grade for access into the home. Robertson Custom Elevators designs elevators that can be incorporated into a very small 40" x 50" (1015 x 1270 mm) area that blend with existing decor. Each installation is designed to accommodate mobility needs, and the abilities of the client.
- **Short Lift**
  A free standing "plug in" lift intended for outdoor use where access from grade level to the main floor is desired. The standard model serves up to 60" (1500 mm).
- **Stair Lift**
  The Wheelchair Stairlift is the most economical vertical transportation available. Additional units may be installed to serve other levels, using a single hydraulic drive.

made in CANADA / fabriqué au CANADA

Robertson Custom Elevators
1734 Orangebrook Court, Unit 9
Pickering, Ontario
L1W 3G8
Tel: (416) 420-3538
FAX: (416)420-5043

®

Printed in Canada

CONTROLLED ACCESS LIFTS FOR THE HANDICAPPED

MODEL C-400-H

This lift is designed, manufactured and installed to meet the Code requirements of the Canadian Standard Association CAN 3-B355-M81.

1. CAR

.car carriage of welded tubular steel construction designed for minimum deflections
.platform size is 32" x 52" clear, steel, finished with non-skid paint
.car sides are 42" high melamine faced decorative panels in tubular steel framework.
.car controls consist of stainless steel button plate containing floor selecting buttons (constant pressure), door lock release and emergency stop buttons. Car controls isolated from landing by electronic timer.
.lighting above lift platform is by others. Emergency lighting is provided to automatically illuminate platform during power failures. (enclosed shaft only)

2. RAILS

.two 8 lb. T. section guide rails. Rail section with mounts, cross bracing are factory jigged and welded for accuracy and stability.
.rails are free standing, preassembled at the factory. On taller units, rails will be braced back to a wall.

3. DRIVE

.unit is drawn hydraulically by means of a cylinder positively attached to the car.
.oil port is restricted by means of a small bore fitting sized to limit down speed in the event of line rupture. Flexible connection to pump is SAE 100 R2 hose with permanently attached fittings tagged as to proof pressure.
.hydraulic pump and motor are sized to speed and lift capacity and specified for the project.
.a relief valve is supplied which is set for rated load and speed, then tagged by the licencing body.
.a manual lowering valve is provided.

4. CONTROLLER

.CSA approved controllers are supplied.
.controller supplied with back up 24 V D.C. power pack.
.adjustable electronic timers are provided to control door locks and isolation of car from landings. (Car cannot be called away before user has had time to enter or leave).
.emergency in-car lowering is provided by auxillary battery power supply.

.../2

5. DOORS AND LANDINGS (if supplied)

.1½ hr ULC labelled doors
.2 speed adjustable hydraulic closer
.heavy duty ball bearing hinges
.Georgian wire vision panel
.pull
.door and frame factory fitted with elevator interlock, and installed in rough openings as a unit
.frame supplied with integral sill
.call position is stainless steel with key switched to activate door lock or call car

6. DOOR LOCKS

.doors are normally locked. Door locks are electrically released by key. Car carriage is, therefore, secured at all times against vandalism, even when car is at the landing, (if hoistway is fully enclosed.)
.interlock provides mechanical locking of doors for fire rating as well as elevator security. No latch is required.

7. CAPACITY

.up to 400 pounds (one person in wheelchair)

8. SPEED

.12 feet per minute

9. HOISTWAY REQUIREMENTS

.approximately 53" x 53" finished hoistway or enclosure required
.minimum 42" high barrier wall at top level
.light in pit with 2 plug recepticle (110V) if fully enclosed
.location for controller adjascent to hoistway
.208 3 ph or 240 1 ph supplied to a fused disconnect beside controller. Disconnect to be Commander HD 1032N or equivalent C/W micro switch interlock.

11. DRAWINGS

.shop drawing for hoistway supplied as required
.all necessary engineering drawings, certification submissions, and inspections provided, and fees paid
.licenced fee paid by owner upon inspection

.../3

11. WARRANTY

.the entire installation is guaranteed for a period of one year
.the guarantee covers replacement of defective components at no cost. The guarantee does not extend to labour cost associated with replacement of parts after the initial 3 months.

****

CONTROLLED ACCESS LIFTS FOR THE HANDICAPPED

MODEL C-550-H

This lift is designed, manufactured and installed to meet the Code requirements of the Canadian Standards Association CAN 3-B355-M81.

1. Car

.car carriage of welded tubular steel construction designed for minimum deflections
.platform size 36" x 60" clear, steel finished with non-skid paint
.car sides are 80" high melamine faced decorative panels on tubular steel framework
.car trim is 1/2" x 1 1/2" stainless corner moldings with 6" stainless kick plate
.car controls consist of stainless steel button plate containing floor selecting buttons (constant pressure), door lock release and emergency stop buttons. Car controls isolated from landing by electronic timer
.ceiling is egg crate louvre
.lighting is 2 tube flourescent fixture mounted above the ceiling, integral with the car carriage. Emergency lighting provided to automatically illuminate car during power failures.

2. Rails

.two C 3 x 4.2 A36 rails, spliced and pinned at joints. Rail sections with mounts, cross bracing are factory jigged and welded for accuracy and stability.
.rails are anchored to solid block or poured concrete mounting points or through-bolted with back-up plates

3. Cylinder

.cylinder is positively attached to the car
.oil port is restricted by means of a small bore fitting sized to limit down speed in the event of line rupture
.flexible connection to pump is SAE 100R2 hose with permanently attached fittings, tagged as to proof pressure

4. Pump and Valving

.hydraulic pump and motor are sized to speed and lift capacity and specified for the project
.a relief valve is supplied which is set for rated load and speed, then tagged by the licencing body
.up acceleration, down acceleration and speed adjustments are provided on the valve body
.a manual lowering valve is provided

.../2

5. Controller

.CSA approved controllers are supplied
.controller supplied with back up 24V D.C. power pack
.car may be operated in the down direction in the event of power failure. Door locks also function normally.
.adjustable electronic timers are provided to control door locks and isolation of car from landings.(Car cannot be called away before user has had time to enter or leave).

6. Doors and Landings

.3/4 hr or 1 1/2 hr ULC labelled doors
.2 speed adjustable hydraulic closer
.heavy duty ball bearing hinges
.Georgian wire vision panel
.pull
.door and frame factory fitted with elevator interlock, and installed in rough openings as a unit
.frame supplied with integral sill
.call position is stainless steel with key switch to activate door lock or call car

7. Door Locks

.doors are normally locked. Door locks are electrically released by key. Car carriage is, therefore, secured at all times against vandalism, even when car is at the landing.
.interlock provides mechanical locking of doors for fire rating as well as elevator security. No latch is required

8. Capacity

.up to 1000 pounds (one person in wheelchair and one attendant).

9. Speed

.30 feet per minute.

10. Hoistway Requirements

.approximately 50" x 61" finished hoistway required with solid block mounting points on one 61" wall
.light in pit with 2 plug receptacle (110V)
.machine room adjacent to hoistway
.208 3 ph or 240 1 ph supplied to fused disconnect in machine room, Commander HD 1032N or equivalent c/w micro-switch
.smaller hoistways can be accommdated with reduction in car size.

.../3

11. Drawings

.shop drawing for hoistway supplied as required
.all necessary engineering drawings, certification submissions, and inspections provided, and fees paid
.licenced fee paid by owner upon inspection

12. Warranty

.the entire installation is guaranteed for a period of one year
.the guarantee covers replacement of defective components at no cost. The guarantee does not extend to labour cost associated with replacement of parts after the initial 3 months.

* * * * * * * * * * * * * * * * *

GENERAL DESCRIPTION OF ELEVATOR OPERATING AND EMERGENCY CIRCUITS

A. CIRCUITS TO MOVE THE CAR UP OR DOWN

1) To move the car, all interlocking switches that are in series must be in the closed position i.e. all doors in the closed and mechanically locked position.

2) Select and press the floor button to the desired level. A constant pressure is required to keep the car in motion.

3) The car will stop automatically at the selected floor. To open the door from inside the car, press the button marked "DOOR" and this will unlock the door. There is a ten second time period in which to open the door. If the door is not opened, the door will relock. If this happens, just repress "DOOR" button to unlock door. When the door closes, it will lock and make up circuit for the car to move.

4) When a "CAR" button is pressed, the landing call positions are made inoperable and remain that way until ten seconds after the car button has been released.

5) To call the car at a landing, a key must be inserted into a key switch beside the door and turned to the call position. The car will come. When the car has arrived, turn the key in the opposite direction. This will unlock the door. There is a ten second time period in which to open the door.

B. EMERGENCY SHUT-OFF CIRCUITS

a) Two contactors supplying current to the motor will release if the circuit is opened at any of the following locations:

-at red emergency button positioned in the car where the floor selecting buttons are located. This button will lock in place when pressed in, and will release when pressed again.

-at red button in pit on wall immediately inside door.

b) Whenever this circuit is opened, a relay will fall off closing a circuit and operating an alarm. This indicates that there is trouble with the lift.

****

MOBILE PLATFORM LIFT

The Mobile Platform Lift is a free standing, movable lift, intended for use in public areas where access for the disabled is required occasionally, or where permanent installation cannot be accommodated. The lift can be transported so can be used in different locations in a multi building institution.

Application:

The Mobile Platform Lift is a portable lifting device. Since it is not permanently installed in a location, licensing is not required. It is equipped with easy-rolling swivel castors, so that it can be conveniently moved from its storage location when required. This equipment is not intended as a Controlled Access Lift. If there is any doubt concerning its application, advice should be sought from the Regulating Authority in your area.

Car:

- Car Carriage of welded tubular steel construction
- Platform size 30" x 48" clear, steel, finished with non-skid paint. Ramp/safety flap, 30" x 12" clear, steel, finished with non-skid paint. Ramp/safety flap deploys automatically.
- Car side is 15" steel on drive tower side, to which a 36" high control pedestal is mounted. Opposite side has 15" high barrier rail with guide for wheel-chair castor wheels. Railing can be made removable if end-side access is contemplated. (End-end access is standard.
- Car is removable. Electrical connections by means of a quick disconnect plug.

Rails:

- Two C 3x4.2 rails contained in an integral structure consisting of base, rail lateral supports, and drive components.
- Base is removable, and is fitted with four 4" locking swivel castors.
- Molded fibreglass, non chip cover.

.../2

Drive:

- ½ H.P. 110V motor connected to a screw by way of jack shaft and pulleys, to achieve required speed reduction.
- Lift by means of a 5/8" screw and recirculating ball nut, bushed and centred in 1" bearings top and bottom.

Controls:

- 24V control circuits
- adjustable stopping switches, top and bottom
- key switched toggle control on car
- key switched toggle control on drive housing for attendant operation
- safety touch plate under platform which will stop the platform's downward movement if any obstacle is encountered

Capacity:

- up to 400 lbs (one person in a wheelchair, or seated)

Speed:

- 12 feet per minute

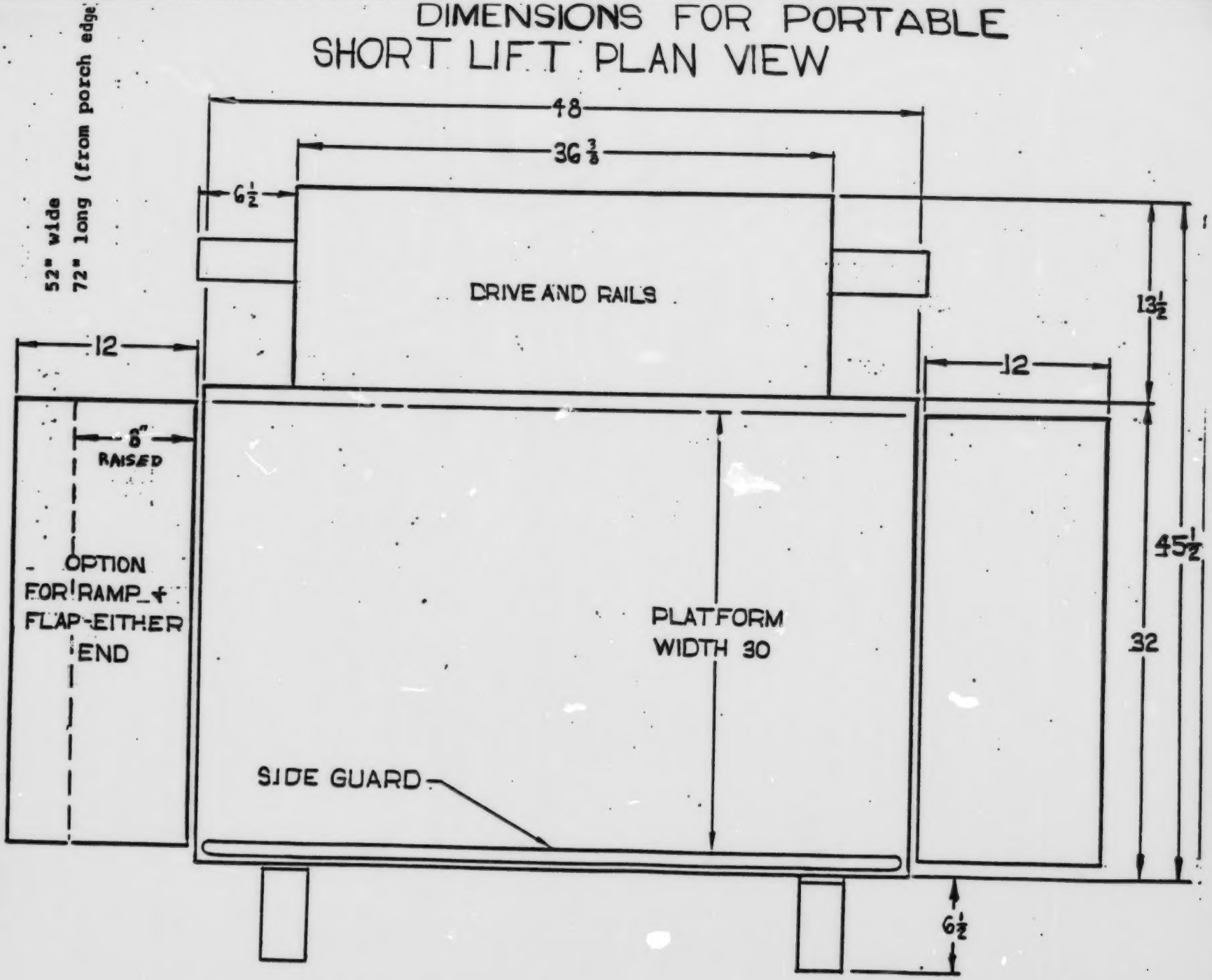
Overall size:

- width, including wheels, 52"
- length, with ramp/safety flap down, 60"
- height, for standard 48" travel, 68"

Warranty:

- the entire unit is guaranteed for a period of one year
- the guarantee covers replacement of defective components at no cost.
  The guarantee does not extend to labour costs associated with replacement of parts after the initial 3 months.

DIMENSIONS FOR PORTABLE SHORT LIFT PLAN VIEW



CONTROLLED ACCESS LIFTS FOR THE HANDICAPPED

MODEL C-180-HS

The Robertson Custom Elevators Wheelchair Stairlift is a free standing inclined platform lift which is designed and manufactured to meet the code requirements of the Canadian Standards Association Can 3-B355-M86. The single rail attaches to the stairs only. No wall, posts or stanchions are required to support the track or platform. The driving unit may be installed in any convenient location and need not encumber a narrower stair or hallway.

1. Capacity

   Up to 400 pounds. One person in a wheelchair.

2. Speed

   22 feet per minute.

3. Car

   - Car carriage and platform is welded tubular steel construction, designed for minimum deflection, and is field adjustable for inclination angle between 32 degrees and 45 degrees.
   - Platform size is 28" x 36", 28" x 44" between deployed safety flaps.
   - The platform has a 28" x 6" safety flap at each end. At the lower landing, the leading flap automatically folds down to form an access ramp, while at the upper landing, the trailing flap becomes a bridging ramp. Flaps lock in the safety position when the platform is over 6" from either landing.
   - Platform thickness is 1", 1.5" including underside safety touch plate. The platform surface will stop 1" - 1.25" above the lower landing.
   - Carriage and platform is finished with two coats of rust resistent enamel, non-skid surface on platform and flaps. The carriage side is trimmed with melamine wood grain panel.
   - The platform folds against the carriage side. Folded thickness of carriage and platform is 8".

.../2

4. Rail

. 2" x 6" tubular steel in one or more lengths, depending on total travel. Joints, if required, are factory fitted to ensure tight and smooth splice
. The rail is attached to alternate treads by adjustable mounts, placing top running surface of the rail at about 22" above the stairs. The rail projects 30" beyond the first riser and 2" beyond the top landing bull nose.
. Fastening of mounts to the tread are by 4 lag screws to wood; drop in threaded anchors to concrete; or by field welding to steel.
. Rail and mounts are finished in two coats of rust-resistant enamel.

5. Lifting Means

. The carriage and platform is moved by a hydraulic cylinder acting on a sheave and cable arrangement yielding a 2:1 lift advantage. The cylinder is about one half the length of the rail and hidden behind it.
. The carriage is protected by a safety brake, automatically activated if the suspension cable goes slack, which also disconnects power to the drive unit.
. An oil port at the cylinder is restricted by means of a small bore fitting sized to limit down speed in the event of hydraulic line rupture.
. The flexible connection to the power unit is SAE 100R2 hose with permanently attached fittings, tagged as to proof pressure.

6. Power Unit

. The hydraulic pump and motor is sized to rated speed and lift capacity, and specified for the project.
. The pump is supplied with a manual lowering valve, line gate valve, and pressure compensated flow control valve to equalize full load and no load down speed.
. A relief valve is set for rated load and speed, then tagged by the licencing body.
. A CSA approved controller is mounted integrally with the pump, and factory wired and tested. 24V DC emergency power is provided to operate an alarm in the event of power failure; and to permit the carriage to be lowered from either platform or landing.
. Power unit measures 10"D x 32"W x 16"H and may be placed in any convenient, accessible location in proximity to the stairway. Alternately, the drive can be supplied its own cabinet, and be placed at either landing.

.../3

7. Controls and Operation

. Car and two landing controls consist of a stainless steel button plate containing up, down and emergency buttons, and security key switch.
. Landing controls are supplied in a 4" x 4" x 3" deep box for surface mounting.
. The security key switch at any station will activate that station only. Directional controls are constant pressure, and the key is removable in the off position only.
. The carriage will be stopped if the platform safety touch plate or either safety flap come in contact with any obstacle on the stair. Pushing an emergency stop button will also stop the carriage. In either case, the emergency alarm will be sounded.

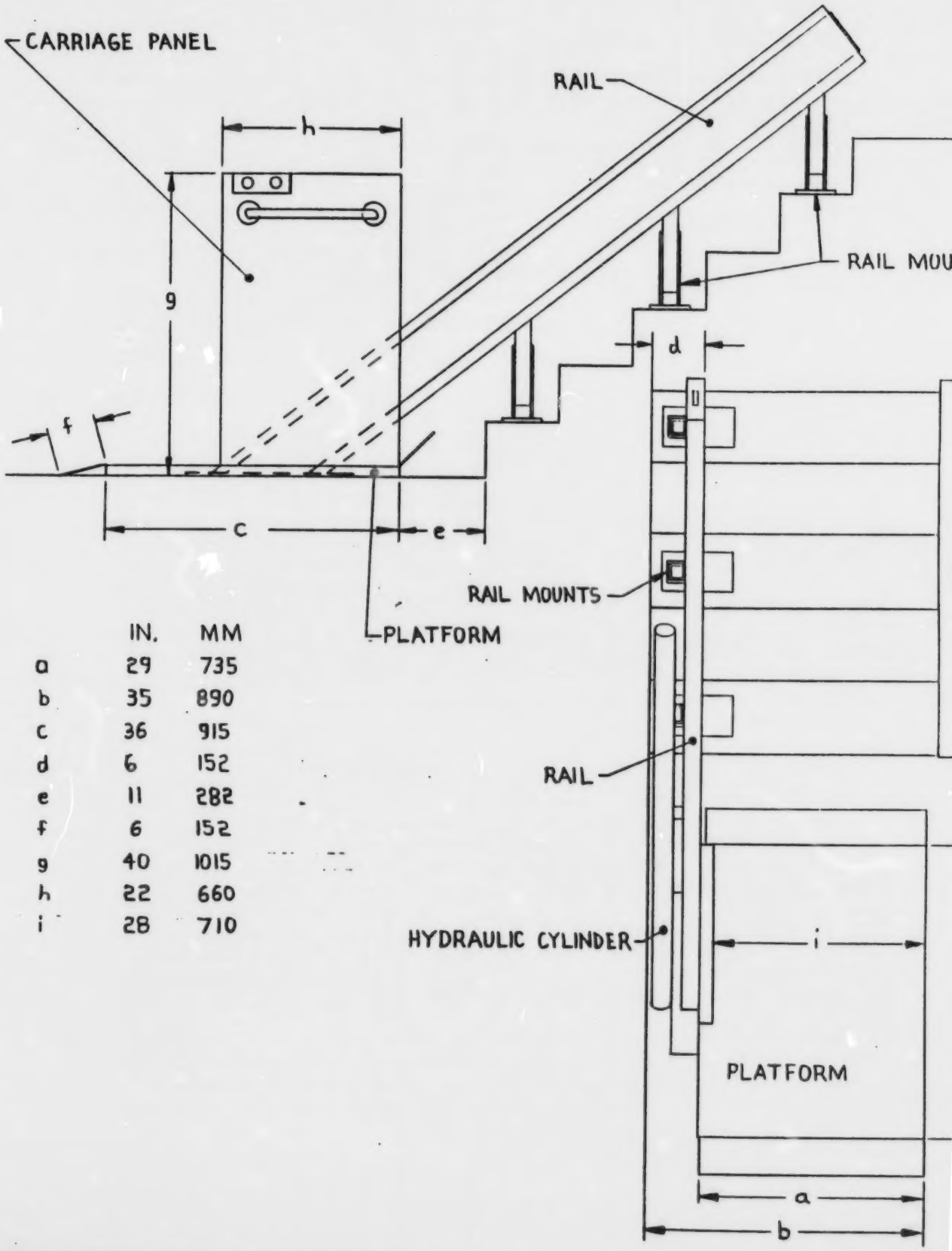
8. Drawings

. Shop drawings supplied as required.
. All necessary engineering drawings, certification submissions, and inspections provided, and fees paid.
. Annual licence fee paid by the owner at the time of inspection.

9. Warranty

. The entire installation is guaranteed for a period of one year.
. The guarantee covers replacement of defective components at no cost. The guarantee does not extend to labour cost associated with replacement parts, or adjustment, after the initial 3 months after inspection.

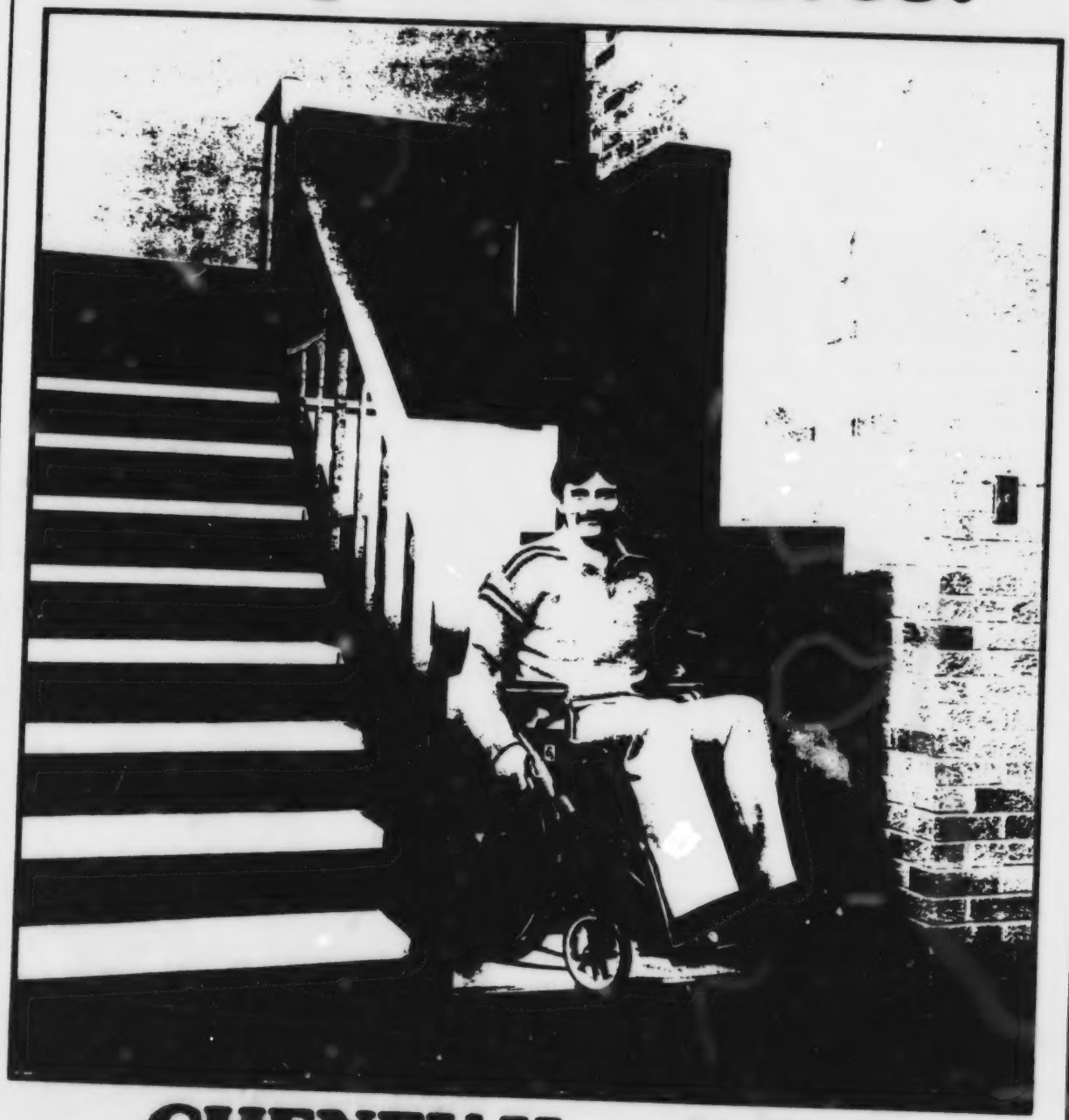
STAIR LIFT



	IN.	MM
a	29	735
b	35	890
c	36	915
d	6	152
e	11	282
f	6	152
g	40	1015
h	22	660
i	28	710

Helping people help themselves.

14420/CHE
BuyLine 3019



CHENEY Handi-Lift® Vertical Wheelchair Lift

The CHENEY Company NEW BERLIN, WISCONSIN 53151

A Medaquip Healthcare Company

BR-6E (Rev 1/88)

The CHENEY Company

Handi-Lift® Vertical Wheelchair Lift

The Handi-Lift®...The space efficient vertical Wheelchair Lift.

The Cheney Handi-Lift provides easy stairway access for people with physical handicaps, including those confined to wheelchairs. The Handi-Lift is adaptable to both indoor and outdoor applications in private homes, churches, schools, office buildings and industrial plants.

Some outstanding features are:

- Space efficient installation without sacrificing platform area.
- 500 pound load rating...optional 750 pound load rating available.
- Lift height to 12 feet.
- Esthetically pleasing design with a variety of colors available.
- UL Listed
- Optional 3-Stop Package

The Handi-Lift's space efficiency requires less floor area than competitive units. The overall cabinet width of 48", up to 10" less than other lifts, allows installation in very confined areas. The Handi-Lift achieves this narrow width without sacrificing platform size. A full 12 square foot platform is maintained inside the barriers.

A 500 pound load rating with an optional 750 pound rating makes the Handi-Lift the most versatile unit on the market.

Because the Handi-Lift comes in a variety of panel selections, even the most discriminating will find it an attractive solution to accessibility problems.

The Handi-Lift is available in five lifting heights, ranging from 4 feet to 12 feet. In heights 6 feet and over, a wall mount is required. Complete information for mounting is available from The Cheney Company.

Units illustrated in this brochure are shown with options that may be required for public building installations: a 42" gate on the platform and at the upper landing. Each gate features a mechanical lock and electric contacts to prevent movement from a landing unless the gate is both closed and locked.

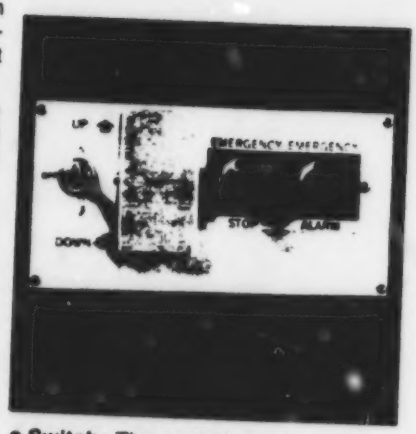
A forward ramp/guard plate operates automatically, providing easy wheelchair access. To operate the unit, the passenger activates a switch, causing the platform to raise or lower.

If a unique or unusual installation or code situation demands custom fabricating, our Application Engineering Department is ready to provide you with professional assistance.

NOW AVAILABLE: 3-Stop Package to allow passenger to exit or enter at 3 different levels. May be used with or without the Enclosure. Another reason why you'll find the Handi-Lift in prestigious locations across the country...It's the architect's choice!

Standard Design Specifications and Features

- **Design:** Handi-Lift is designed to meet the ANSI A17.1 and UL requirements.
- **Rated Load:** Capacity 500 lbs. in compliance with A17.1. 750 lbs. capacity available as an option.
- **Distance of Travel:** Total of 12' and up to 3 stops.
- **Overspeed Safety:** Velocity sensitive overspeed mounted to carriage. Mechanically engages the column, if actuated. Available as an optional feature.
- **Machine Housing:** Located adjacent to the platform. Housing structure height is variable (maximum travel + 19¼") x 8¼" deep and 36" wide.
- **System Control:** 24 VAC
- **Operator Control:** Controls are constant pressure and can be used by passenger or attendant.
- **Motor:** ½ HP — 1750 RPM instant reversing, 240 volt, 5.5 amps, single phase.
- **Brake:** A spring actuated, electrically released brake is mounted directly on the ball screw shaft. Braking action is automatic upon release of any of the control switches.
- **Drive:** Recirculating ball screw with rotating screw.
- **Ball Nut Back Up:** The ball nut has an integral back up system to prevent uncontrolled descent in the unlikely event of a ball nut failure.
- **Limit Switches:** In the event of a failure of a control limit switch, a final limit switch activates to cut off all power to the Lift.
- **Platform:** 12 sq. ft. with non-skid surface.
- **Ramp:** The platform is equipped with a ramp which locks in the up position acting as a guard. (Deleted in pitted applications.)
- **Platform Sensors:** Platform is equipped with underpanel sensor that stops downward movement if an obstruction is encountered.
- **Platform Side Enclosures:** Full 42" high platform side enclosures are designed to meet ANSI A17.1. 42" high platform and landing gates are available as optional equipment.
- **Finish:** Electrostatically deposited polyester finish.
- **Rated Speed:** 12 ft. per minute.
- **Warranty:** The Handi-Lift has a limited warranty. Please contact The Cheney Company for complete information.



- **Switch:** The control paddle switch is mounted on the face of the machine housing within easy reach. It is actuated with the hand, arm or elbow. A key control limits operation to authorized persons. Also shown are the optional emergency alarm and stop switches.

Note: Specifications and dimensions are subject to change without notice.

Installation Drawing

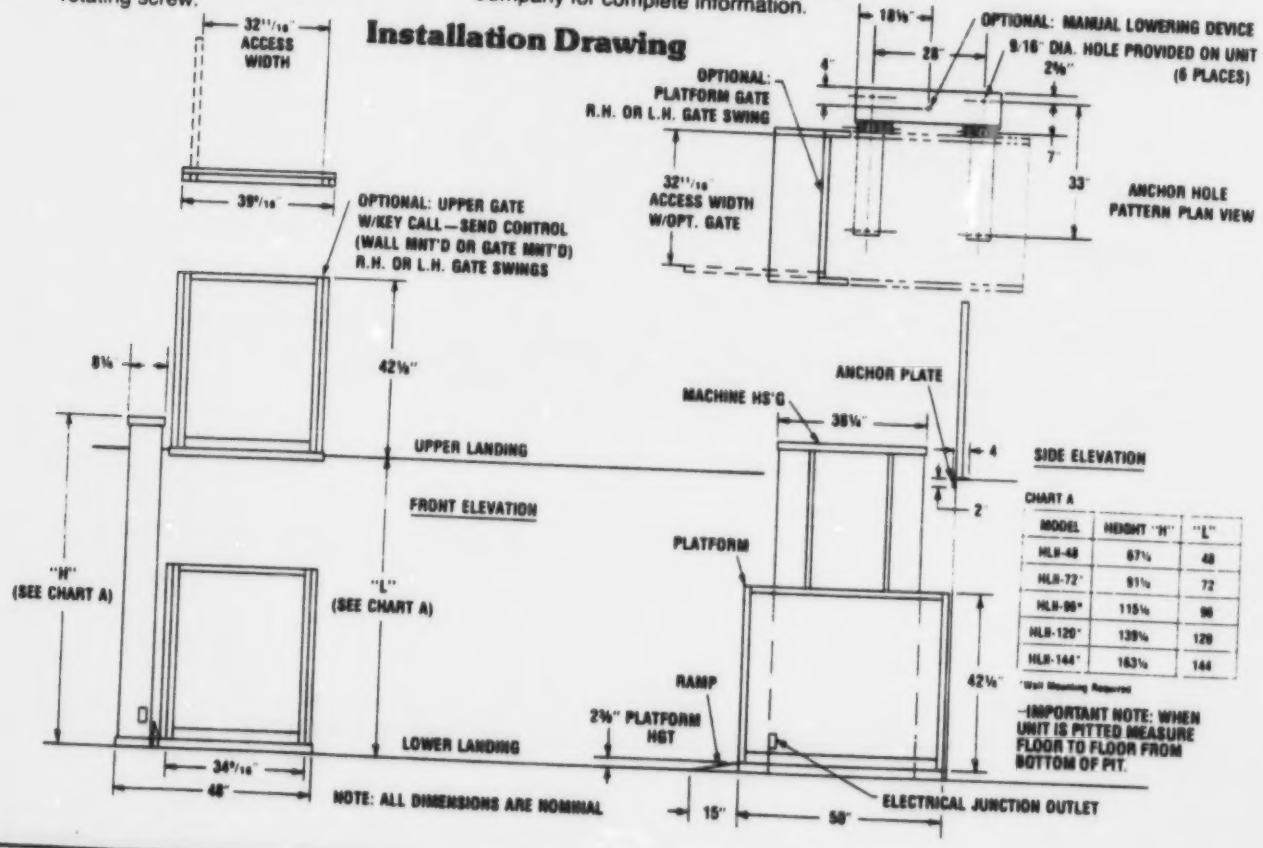


CHART A

MODEL	HEIGHT "H"	"L"
HLH-48	67⅛	48
HLH-72*	91⅛	72
HLH-96*	115⅛	96
HLH-120*	139⅛	120
HLH-144*	163⅛	144

*Wall Mounting Required

IMPORTANT NOTE: WHEN UNIT IS PITTED MEASURE FLOOR TO FLOOR FROM BOTTOM OF PIT.

Handi-Enclosure®

Standard Design Specifications and Features

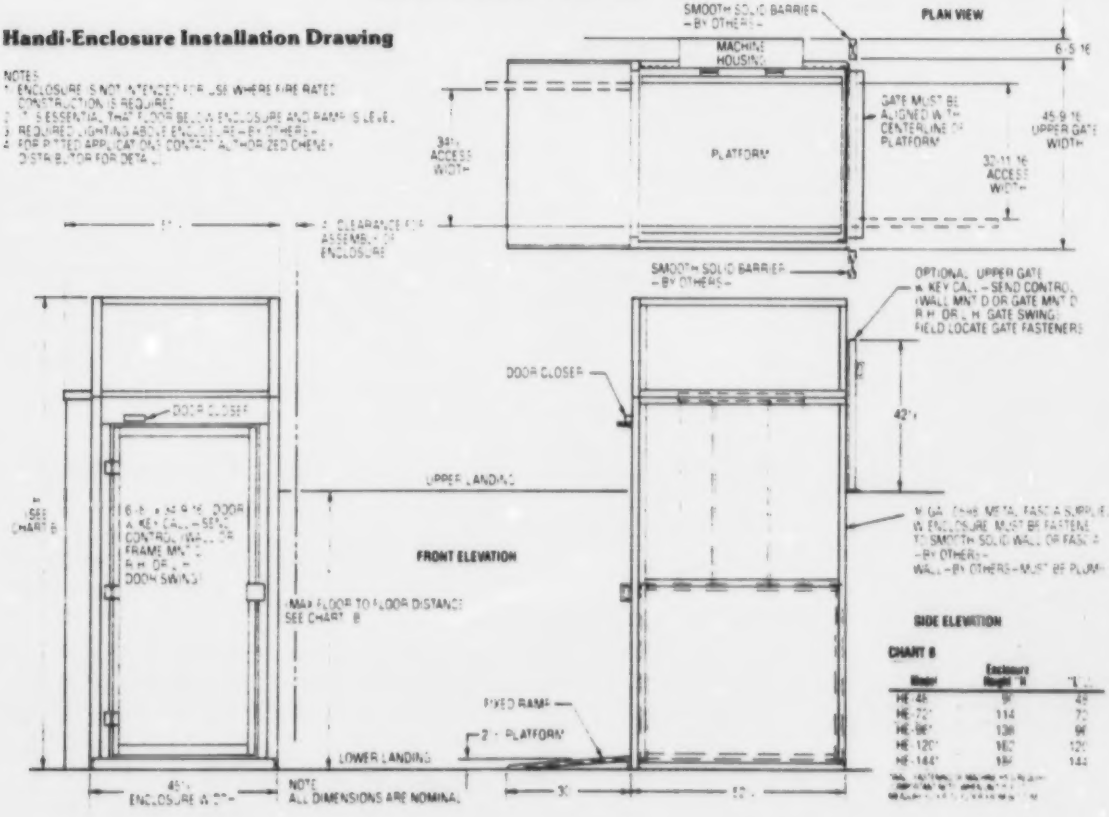
- Designed to ANSI A17.1
- ¼" Thick bronze tinted plexiglass panels (standard)
- Enclosure can be provided without panels for custom installations Consult The Cheney Company for panel thickness and sizes
- Fascia Plate
- Designed for ramp or pitted installations
- Panel framing in 1½" square x .083" wall steel tubing
- Optional 3-Stop Package

Control Panel

Call/send controls can be mounted on the wall or as shown on the door frame of the enclosure

Installation Drawing

Handi-Enclosure Installation Drawing



Handi-Enclosure®

The perfect combination of good looks and maximum code compliance.

If state or local requirements necessitate the use of a hoistway, or restrictive access, the Handi-Enclosure is the answer. The Enclosure is adaptable to indoor applications in public buildings and private homes.

All Enclosures have a standard 6'8" door which is an integral part of the design. The door is equipped with an electro-mechanical lock which prevents movement of the platform from the landing unless the door is both closed and locked.

The Enclosure is built so that the Handi-Lift becomes a part of the structure. A 16 gauge steel fascia plate is mounted to the frame providing a continuous smooth surface from the floor to the top landing. The Enclosure is shipped in sub-assembled panels that are easily erected at the job site.

A permanent ramp (slope 1 in 12) allows easy exit at the lower end.

An optional 42" high upper landing gate with matching plexiglass panel can be provided. Gate will be equipped with a mechanical and electrical lock.

The bronze plexiglass panels are standard and while we do not offer other panel choices, the Handi-Enclosure can be shipped without panels so that you can customize but must meet local codes and ANSI strength requirement. Please contact our Application Engineering Department as to what weight and size materials to obtain. You can make the Handi-Enclosure... The Ultimate Enclosure!

Outstanding Features:

- Sleek design that enhances surroundings
- Can accommodate lifts to 12'
- Bronze tinted plexiglass panels
- Rugged steel support framing
- Optional Outdoor Dome*

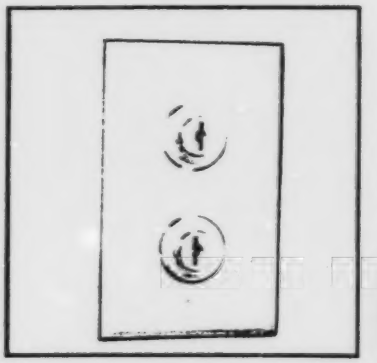
***Ask about our New Dome... Another ultimate option... designed specifically for outdoor installations... available early 1988.**

Handi-Lift® Vertical Wheelchair Lift

Optional Equipment

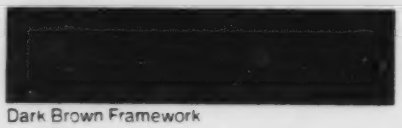
- 750 Pound Load Rating: An uprated version of the standard Cheney Handi-Lift providing 750 pound lifting capacity without altering the external size or appearance of the Lift.
- Electro-mechanical Locked Gates: Platform gates are 42" high and self-closing. Locks on the gates are mechanical and electrical. The locks allow the gate to be opened only when the platform is present. They will not allow the platform to ascend or descend when the gates are opened. Electrically actuated and locked upper and lower landing gates are also available.
- Overspeed Brake. Totally independent positive drive mechanism to prevent the free-fall of the platform in the event of failure of the ball nut back-up system.
- Call-Send Controls: Call-Send Controls, which allow the operation of the Lift from either landing, are available to meet a variety of functional and mounting requirements. Contact The Cheney Company for complete information.
- Manual Lowering: Provisions for manual lowering can be provided.
- Special Paint: Custom painting of the Handi-Lift in a color other than the standard Dark Brown is available at extra cost.

Note: The Cheney Company reserves the right to change specifications and dimensions without notice.



Color Selections

Cheney's standard finishes have been carefully selected to enhance virtually any decor. Standard painted surfaces are Dark Brown (See Special Paint listed above.) Panel surfaces are available in three finishes: Wood Grain, Off-White Linen and Textured Finish for outdoor use.



Dark Brown Framework

Off-White Linen Fabric Panel Finish

Wood Grain Panel Finish

Textured Finish for Outdoor Use

Other CHENEY Products

Liberty Wheelchair Lifts

Many times the problems of making a building accessible for people in wheelchairs can be solved by including a Cheney Wheelchair Lift. The Liberty Wheelchair Lift is a variable inclined stairway lift designed for carrying a person in a wheelchair from one floor to another. Adaptable for public buildings or private residences, the Liberty Wheelchair Lift can make stairways accessible to the physically handicapped.

Wecolator® Stairway Elevator

The Wecolator stairway elevator can solve stair climbing problems. It allows quick, comfortable transport from floor to floor. The Cheney Wecolator can fit straight, curved, even spiral stairways. It's virtually maintenance free and UL listed. Wecolators can include such options as flip-up arms, key switches and a thin seat which reduces seat height to allow transfer from a wheelchair. The Wecolator can also be adapted for outdoor use. Ask about the Liberty Stairlift. The economical way to get up and down straight stairways.

Also available: The new Victory Wheelchair Lift, Handi-Prolift SE, Ride-A-Stair and Handi-Porch Elevator. Check your Sweet's Catalog or call Cheney for further information.

The CHENEY Company

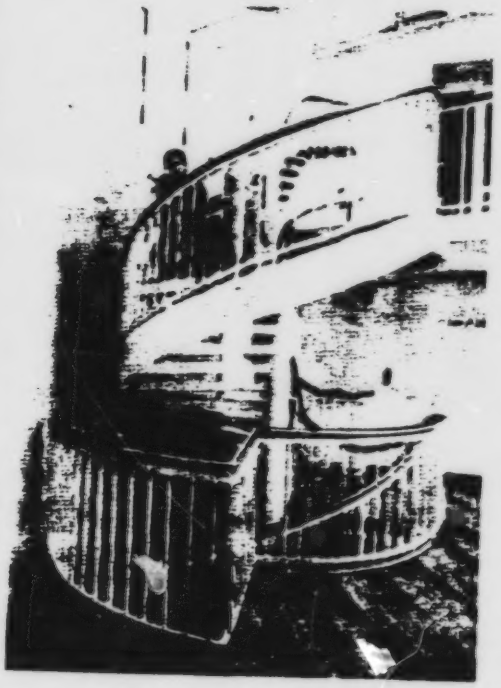
The Cheney Company
2445 South Calhoun Road
P.O. Box 188
New Berlin, Wisconsin 53151-0188
Phone (414) 782-1100 or call Toll Free 1-800-782-1222
Wisconsin Toll Free: 1-800-552-7711
FAX: (414) 7827442

Toll free...Contact the Cheney Co. or call SWEET'S BUYLINE for further information.

PRINTED IN U.S.A.

14425/ARM

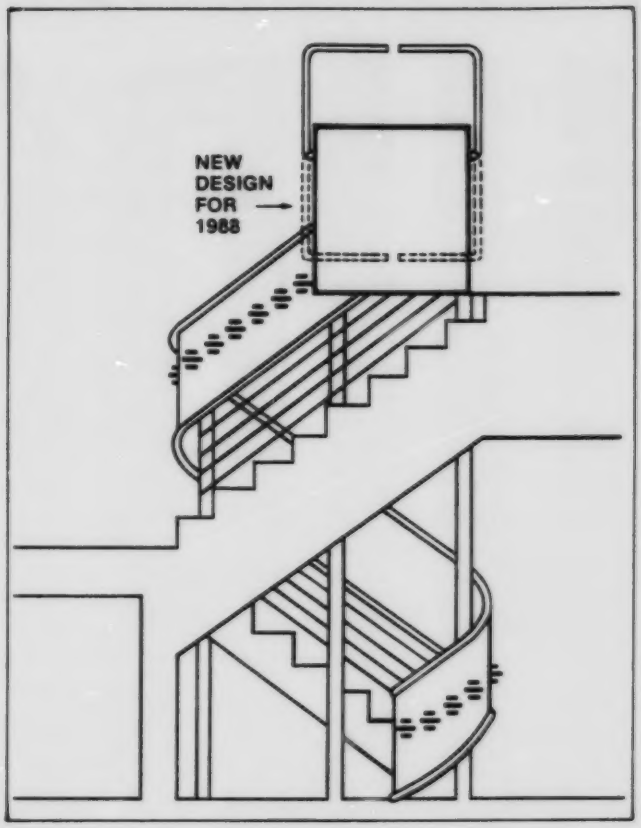
HIRO



"STATE OF THE ART"
SOLUTIONS
FOR
BARRIER FREE
ACCESS

HIRO
LIFT

HIRO 325 can traverse multiple landings on straight and curved stairways.



HIRO LIFT

HIRO 325.

An inclined wheelchair platform lift for the disabled.

Manufacturer

Since the late 1800's, HIRO LIFT has been involved in the engineering, design, manufacturing and service of elevators from their headquarters in Bielefeld, West Germany. Recognized internationally, North American installations of HIRO LIFT technology include window washing platforms for the World Trade Center in New York and the John Hancock Building in Chicago.

Having recognized the need, HIRO LIFT has spent the past ten years concentrating totally on the design and manufacture of stair lifts for the disabled. The entire engineering staff with their combined and considerable expertise continuously refine their high technology, functional design, and product reliability in an expanding model line.

Description

The HIRO 325 is an inclined wheelchair platform lift with fully sequential operation. Incorporating a patented worm-gear drive system, the HIRO 325 is designed for both straight track (325s) and curved track (325c) operation and can negotiate either straight or curved stairways. For either interior or exterior applications, the HIRO 325 can traverse multiple landings and leave stairs free for normal traffic when not in use.

With standard safety features, easy installation and little or no renovation to existing structures, in most cases, the HIRO 325 provides a low-cost, reliable alternative for barrier-free access to public buildings.

Benefits and Features

- interior or exterior application
- no equipment extends beyond the top step
- platform travel length up to 9 metres
- battery operation above 9 metres
- remote control standard with battery operated unit
- automatic battery charging at terminal landings
- optional folding chair available
- available with steep-angle start
- frees stairs for normal traffic
- little or no structural renovation required
- less expensive than conventional vertical elevator
- long life with little mechanical wear

Designed for Safety

- mechanically locked to track when at landings
- due to unique, patented design an overspeed arresting device is not required
- emergency manual lowering to bring platform down in case of power failure

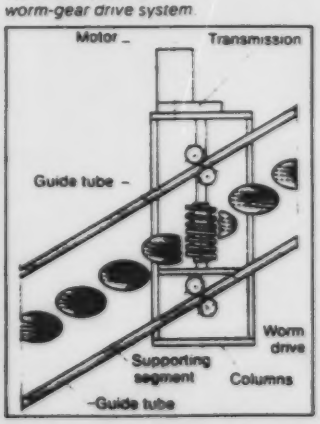
Building Applications

The feature packed HIRO 325 is the ideal choice for barrier-free access in public buildings. Its versatile design and easy installation

Exterior Application

- zinc coated for corrosion protection
- brass drive screw
- stainless steel shafts, tubes, rollers
- heated motor, drive screw, brake

HIRO 325 patented worm-gear drive system



make the HIRO 325 the perfect solution to access problems in a broad range of buildings including: schools, churches, hospitals, libraries, museums, municipal buildings, community centers, arenas, and restaurants.

For your special requirements, send us a photo and sketches for a factory feasibility study.

Specifications

GENERAL PRODUCT DESCRIPTION: Wheelchair platform lift for use on straight, curved, spiral and radiating stairs. All safety features are standard, suitable for either public or private applications, and MEET or EXCEED the requirements of the CAN/CSA B355-M86 and ANSI A17 Part XX CODES. All units are equipped with a manual lowering device on the carriage unit. Lifts can be installed in new or existing stairwells, and a steep start angle of 65 degrees may be used where space at the lower landing is limited. Side loading platforms may also be used. The unique design with platform located drive eliminates projection beyond the top step. An outdoor package is available.

SCOPE: All units are supplied and installed including any accessories ordered.

SPEED: Maximum 0.15mps (30 fpm) straight line travel. This is substantially reduced automatically approaching a turn and is smoothly accelerated again in straight travel.

CAPACITY: Minimum 180 KG (400 lbs.), and Maximum of one person and one wheelchair in accordance with the code, up to 300 KG (660 lbs.)

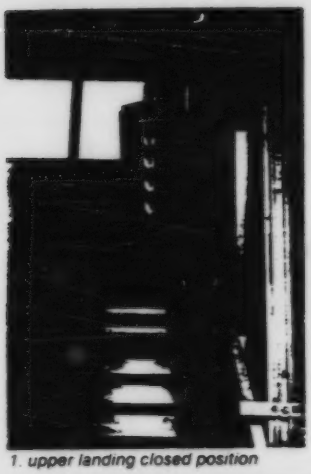
OPERATING CONTROLS: Key switch activated constant pressure buttons are provided at the landings and on the plaform. The platform control is on a coiled cable hand held unit. A stop switch is provided on the platform control unit.

BATTERY POWERED OPERATION: This is available on all applications as an option, but is required on any unit that turns where the travel exceeds 9 meters. Automatic charging of the batteries is achieved at any landing.

VOLTAGES:
Standard: - 208 Volt, 3 Phase
60 Hz, 15 Amps.
- 240 Volt, 1 Phase
60 Hz, 15 Amps.
Battery: - 110 Volt, 1 Phase
60 Hz, 15 Amps.
(Required for the Charger)

OPERATION & CONSTRUCTION: Two parallel, round stainless steel guide tubes and sets of rollers suitable for negotiating curves provide connection between the mounting and the wheelchair platform. Three mm thick steel sheets serve as a means of support for the segments and guide tubes as well as casing for the entire track. Supporting segments are provided between the parallel guide tubes and are factory installed to exact engineering specifications. The platform mounted worm gear travels up and down over these segments. The worm gear can only

Ideal for public building use!

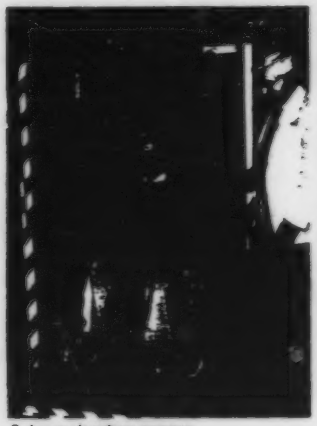


1. upper landing closed position

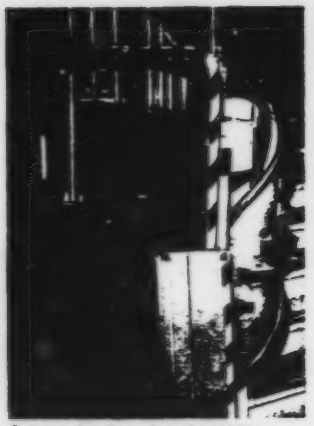
2. upper landing folding open

3. upper landing access

4. platform lowering



5. lower landing access

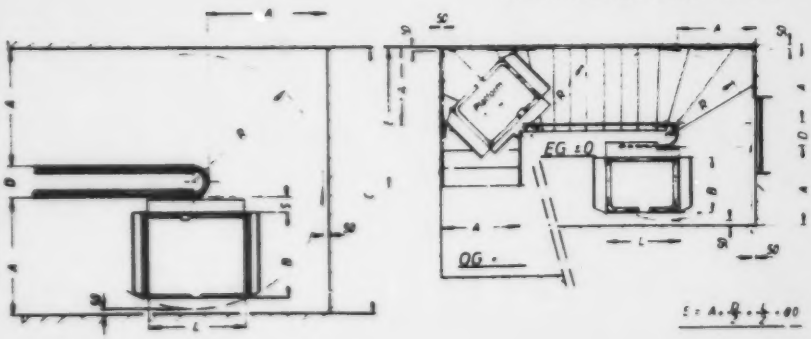


6. lower landing closed position

Diagram B shows a typical stairway of a private residence. The track leads through a 180° curve at the lower floor to a 90° curve at the upper terminal

	B	L	D	A	C	R
Platform 1	600	750	250	905	2059	980
			320	902	2124	1012
			430	898	2227	1063
Platform 2	680	840	250	945	2141	1020
			320	925	2171	1035
			430	938	2306	1103
Platform 3	800	1000	250	1088	2428	1163
			320	1085	2689	1185
			430	1080	2590	1245
Platform 4	900	1200	250	1222	2694	1297
			320	1218	2756	1328
			430	1213	2855	1378

Minimum dimensions depending on platform sizes and track curve radius.



move simultaneously to the entire platform column system moving on the guide rails. Supporting segments of the worm gear provide the means to pull and apply pressure. The drive system is absolutely self-locking eliminating the need for an overspeed arrestor.

DIMENSIONS: Min. 680 mm (26¾") wide by 900 mm (35½") long. Folded platform to wall is 350 mm (13¾") for curved and 320 mm (12½") for straight applications.

GUARANTEE: All parts carry a 2 year guarantee.

CUSTOMER SERVICE: An architectural planning guide with further details is available on request as is assistance with difficult application planning.

CUSTOMER PROVISIONS: Appropriate fused, lockable disconnect with proper power supply at designated location.

Patents and TM Pending. Specifications subject to change without notice.

"Kwik 'n Easy" Installation

The easy, straightforward installation of the HIRO 325 can be completed in 2-3 days with minimal interference with routine stairway traffic.

Technical Support

Full technical support is available locally including an architect's reference package. Factory feasibility studies will be conducted with the provision of site photo and sketches.

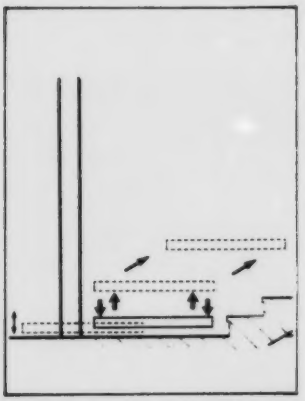
Compliance with Standards

The HIRO 325 technology and design are in compliance with national and international recognized standards.

HIRO LIFT

HIRO 365

A residence vertical inclined wheelchair platform lift.



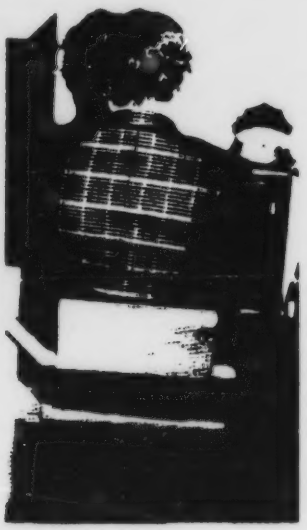
Minimal landing space application designed to fit even the tightest spaces.

HIRO 365 Features

- fully sequential
- minimal landing space application
- 50 centimetre (19½") vertical rise/drop at terminal landings
- optional battery powered, remote control operation

HIRO 165

A vertical inclined chair lift for residential/ public building use.



HIRO 165 Features

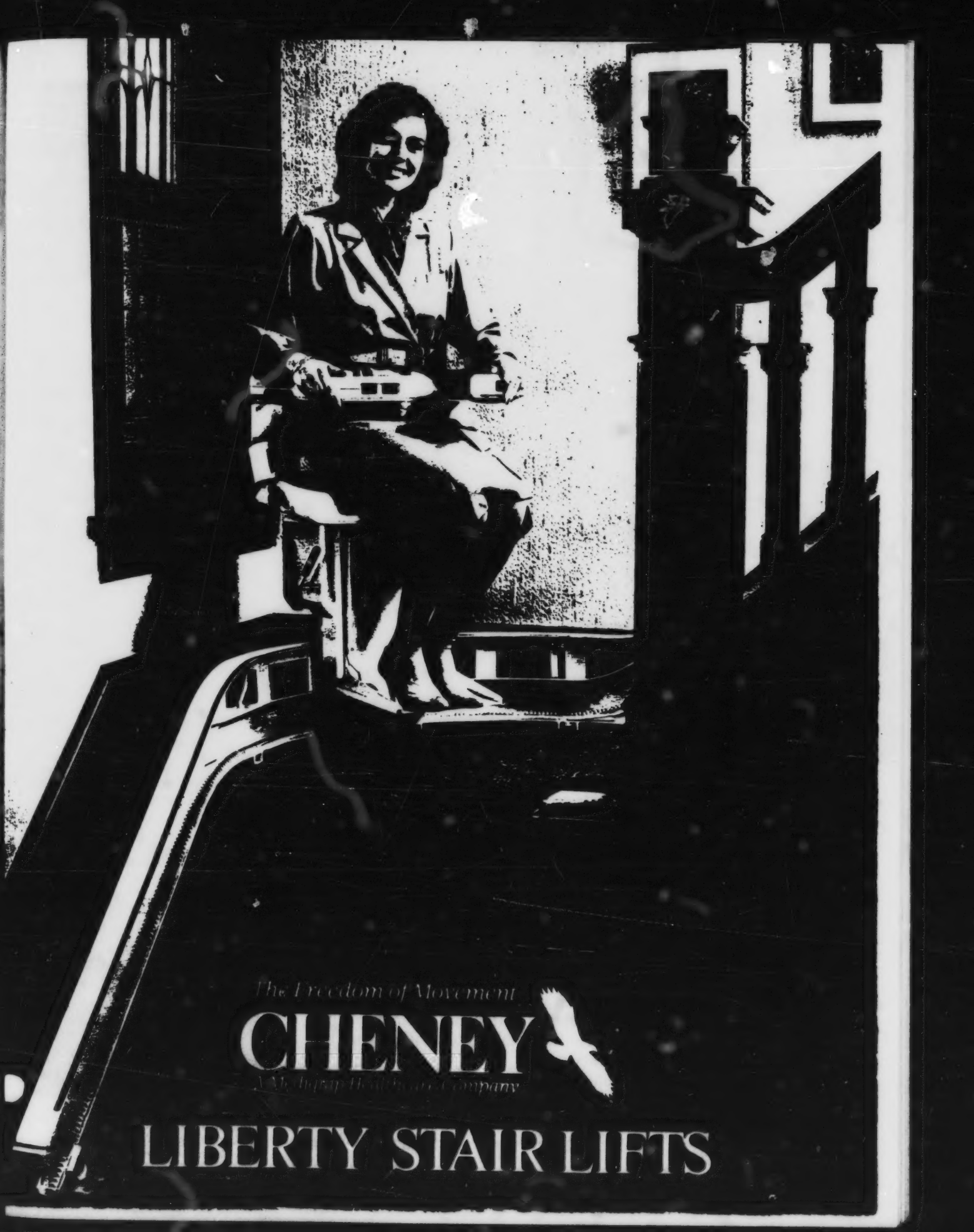
- fully sequential
- minimal landing space application designed to fit even the tightest spaces
- 50 centimetre (19½") vertical rise/drop at terminal landings
- optional battery powered, remote control operation
- fold-up chair and platform

Distributed in Canada by:

CONCORD ELEVATOR INC.
625 Rowntree Dairy Road, Unit 1
Woodbridge, Ontario
L4L 5T9
(416) 856-3030
Fax: (416) 851-6556

A MEDIQUIP COMPANY

Local Representative:


The Freedom of Movement
CHENEY
A Mobility Healthcare Company
LIBERTY STAIR LIFTS

The deluxe Liberty® LX stairway Lift for straight, curved and spiral stairways. The ultimate in superior features, beautiful styling and perfect comfort.

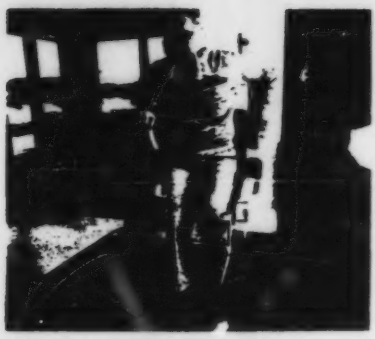
The finest stairway lift ever designed, the Liberty LX will climb virtually any stairway configuration to give you a new freedom of movement.

The most space efficient unit available. The LX rail can fit to within 7 inches of the stair wall and follows the stairway contour perfectly. And the footrest is normally just 6 inches above the steps and landings.

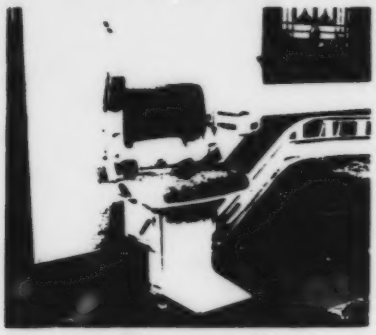
Installs over carpet or directly to the steps. If removal is ever necessary there is barely a trace of the initial installation.

Comfortable, contoured, swivel seat. At bottom or top landings, the seat is designed to swivel and move forward to make getting off easier. This feature is available only on Liberty Lifts.

Other special features. The unique armrests which both rotate and flip up are exclusive only to Liberty Lifts. Fingertip controls are located conveniently on the arm. A light on both sides of the housing illuminates the stairs, the large footrest folds out of the way, and a retractable seat belt is integrated into the design.

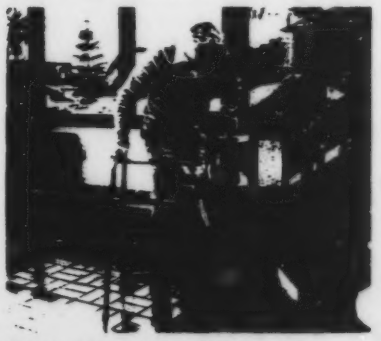


Top Horizontal Overrun allows the passenger to get off the chair away from the stairway. This option is highly recommended if space permits.

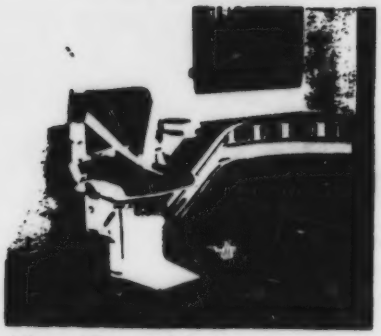


Either or both arms can be flipped up and out of the way. During chair operation, arms should be lowered and rotated inward to gently surround passenger.

To make getting off easier at top or bottom landings, the LX's seat swivels up to 90° and moves forward . . . another Liberty Lift exclusive feature.



People who feel that they may have difficulty transferring from their walker are pleasantly surprised at how easy the transfer can be.



Liberty LT's stylish design and special features make it an attractive and welcome addition to any home where someone needs special help getting up stairs.

When the LT's seat is swiveled, its exclusive design also moves forward, putting it in a position to make a transfer just a little easier.

The right armrest of the LT is flipped back out of the way in locked position. Both arms are engineered to take the transfer forces in either position.

With transfer completed, the passenger begins to fasten his seat belt and chest belt, lower the raised arm and "climb" the stairs.

The Liberty® LT opens the whole house to wheelchair users and others with special access needs.

The remarkable Liberty LT has all the deluxe features, styling and comfort of the LX plus special features developed just for more difficult accessibility situations.

Human-engineered to assist wheelchair transfers. When the LT's dual armrests are flipped up out of the way, they lock into position. That way the armrests can be used in either position to help effect a wheelchair transfer with or without a slide board. Or provide extra support to someone on crutches or with upper body weakness.

Swivel seat facilitates the transfer procedure. The comfortable, contoured seat is designed to swivel and move forward at the bottom or top landings.

High, cushioned backrest and chest belt. For those who need extra support, the special high backrest and velcro belt provide upper body restraint. Like the LX, a retractable seat belt and large footrest adds to the security.

Cheney's Liberty® II and I Lifts for straight stairways give you the freedom to get up and down stairs with more economy.

The Liberty® II Lift for straight stairways has some o the features available on the LX stairway lift. The comfortable padded vinyl seat swivels at the top of th stairs making getting off easier. When the flip-up, pad ded armrests are in the riding position they rotate inwa providing the passenger with a feeling of security. A Liberty Lift exclusive.

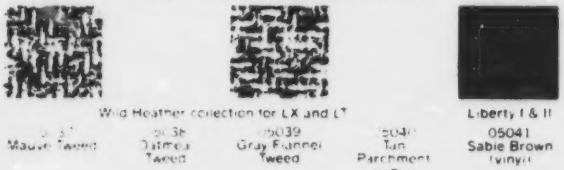
Controls are conveniently located in one arm The seat belt is retractable and the large footrest fold out of the way for easy exit. The chair unit and rail come in a rich sable brown color.

The Liberty® I Lift for straight stairways offers Chen quality construction at a very economical price. It has one flip-up armrest, a retractable seat belt and a comfortable footrest that folds up to make getting off easier. The fingertip controls are located convenient in the arm and allow the lift to reverse directions at any time.

Its attractive sable brown color enhances virtually an decor, and when cost is an important consideration, the Liberty I offers an exceptionally good alternative

Liberty® Lift decorator colors complement any interior.

Fabric for seat and arms

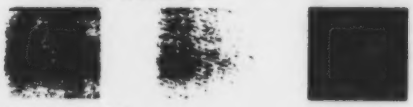


Wild Heather collection for LX and LT

Liberty I & II

Maude Tweed | Oatmeal Tweed | 05039 Gray Flannel Tweed | 05040 Tan Parchment Vinyl | 05041 Sable Brown Vinyl

Rail Colors



Available for LX and LT

Oak | Gray | Liberty I & II Also available for LX and LT Sable Brown

The LX and LT can be tailored to fit straight stairways as well as virtually any other stairway configuration.

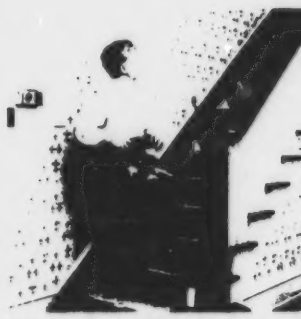
Some examples:

Two straight flights with landing | 90° turn at landing | 180° turn at landing | Spiral stairway

Liberty Lift® Warranty

Cheney's Liberty Lift Warranty is unmatched in the industry. When your Liberty Lift is installed, the individual serial number is registered and you get a printed warranty protecting all parts for two years and the transmission assembly for 5 years, exclusive of labor. One year warranty for other than residential use.

Both Liberty I and II are equipped with retractable easy-to-use, seat belts.



Chair is designed so you ride sideways allowing you to look up and down the stairs as well as forward

Fingertip up and down controls are located conveniently on the downside arm. Chair can reverse direction with the touch of a button.

The Liberty II seat swivels at the top landing to make getting on or off easier.

Cheney Liberty Lifts offer Liberty for all.

If getting up and down stairs is a problem for you or a loved one, there's a Liberty model designed to give you a lift.

If arthritis or emphysema keep you downstairs all day, Liberty LX or II or I will give you new freedom of movement.

If you use a walker due to a heart condition, a stroke, or some other disability, the remarkable Liberty LX has added features to help you to the top.

Wheelchair users and those with upper body weakness will want to consider the very special design elements of the Liberty LT.

Your church, lodge, clinic or inn may find the Liberty LX or LT a simple answer to building access needs.

If your home has a curved or spiral stairway, even intermediate landing, both the Liberty LX and LT will climb virtually any stairway configuration. Liberty for all is just around the corner.

Since 1935, Cheney has earned an international reputation for designing and manufacturing the world's finest inclined stairway lifts, vertical lifts and elevators for residential, commercial and institutional installations. Offering freedom of movement with real reliability has created a lot of friends.

Here are just a few of the wonderful comments we have received from our friends who enjoy their renewed freedom of movement:

"The Liberty Lift gives me more mobility and helps me conserve my energy. It has improved my quality of life."
—K.J., Brantford, Ontario

"I've already recommended the lift to a friend."
—E.S., Phoenixville, PA

"Your Liberty Lift has brought joy to many of our residents already."
—A.M.S., Nerinx, KY

"I analyzed all lifts . . . yours and your competitors'. I am completely satisfied that I chose Cheney's Liberty Lift."
—J.S., St. Clair Shores, MI

"Rugged construction . . . better than four competing brands. Everything the salesman told us was true. And on top of a great product, your installers were so professional!"
—J.R., Wethersfield, CT

"As a retired engineer, I was greatly impressed with the excellent workmanship in your stairlift. I was also impressed with the efficiency and expertise of your installer."
—L.T., Washington, D.C.

"Your representative couldn't have been more helpful. He even went to the hospital to consult with my husband's therapists."
—K.S., Minnetonka, MN

"I would highly recommend the product and the people. The installers gave me a full demonstration and left my home all cleaned up—no clutter."
—H.G., Bergenfield, NJ

"It is more helpful than I even imagined it would be. Deepest thanks to your company for selling such a wonderful product. My brother is able to go upstairs for the first time in five years."
—V.L., Winston Salem, NC

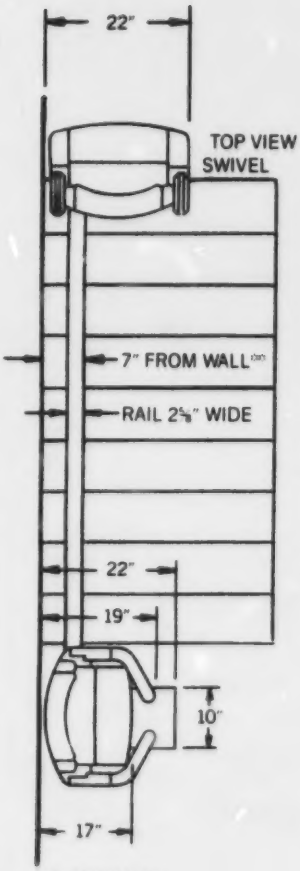
"I would be happy to give you a referral. Because of the lift, we can stay in our home and I have more energy for other things."
—B.C., Kenilworth, IL

If you'd like to see an actual installation, or talk to one of our "friends," just ask your Cheney distributor.

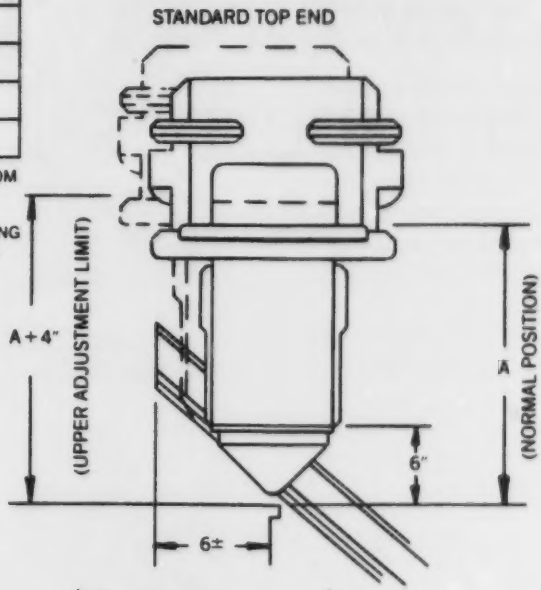
MODEL	(A) SEAT HT.	(B) BACK REST HT.
I	22⅜"	14
II	23⅜"	14
LX	23⅜"	14
*LT	23⅜"	16

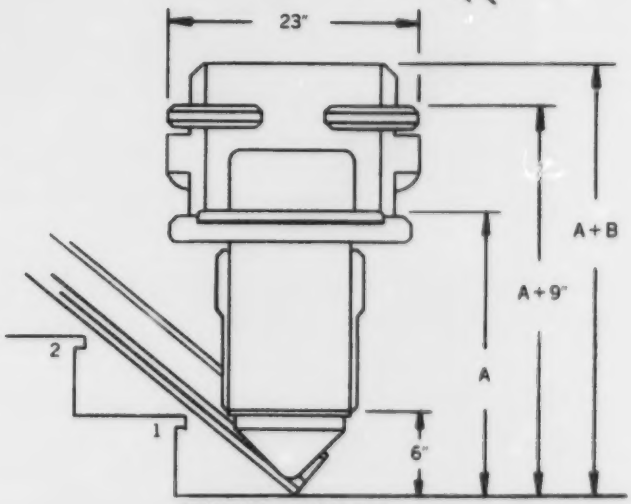
NOTE: DIMENSION (A) MAY BE INCREASED FROM 1" to 4" BY ADJUSTING THE SEAT IN 1" INCREMENTS.

SEAT HEIGHT CAN BE REDUCED 1¼" BY REMOVING SWIVEL SEAT. THIS CAN ONLY BE DONE IF RAIL INCLUDES A TOP HORIZONTAL OVERRUN.



*7" MINIMUM





DETAILS

Notes:

For all applications, the rail can be installed to within 7" of wall or any obstruction. With the rail placed at this distance, the chair will fold to within 12½" from the wall. The normal seat height at the top and bottom landing is (see chart) with the foot rest height 6". The distance between chair arms is 18", and seat depth is 13".

The Cheney Company reserves the right to change specifications and dimensions without notice.

FEATURES:

- ⅓ HP instant reverse motor operates on standard household current (110 volts, 60 HZ)
- The guide rail is a sturdy 4" I-Beam
- Cog-driven mechanism
- Overspeed brake
- Integrated seat belt
- Chair travels at 25 feet per minute
- Carrying capacity up to 300 lbs.
- Dual obstruction sensors on the footrest
- Wall mounted call/send buttons available
- Limited warranty covers all parts for two years and the transmission assembly for 5 years exclusive of labor. One year warranty for other than residential use.
- UL listed and ANSI approved

The Freedom of Movement

CHENEY

A Mediquip Healthcare Company

©Cheney, 1988

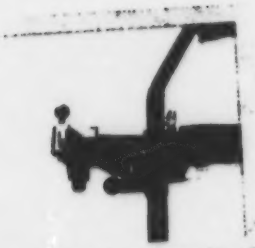
2445 South Calhoun Road, P.O. Box 188, New Berlin, WI 53151 (414) 782-1100

STAIR-TRAC

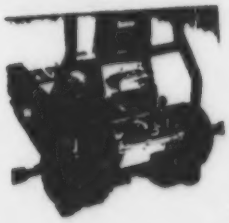
PORTABLE WHEELCHAIR LIFT

GARAVENTA (CANADA) LTD.

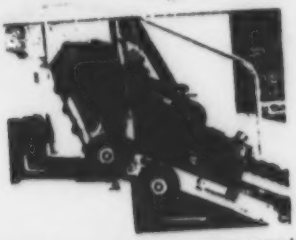
STAIR-TRAC DESIGN & SAFETY FEATURES



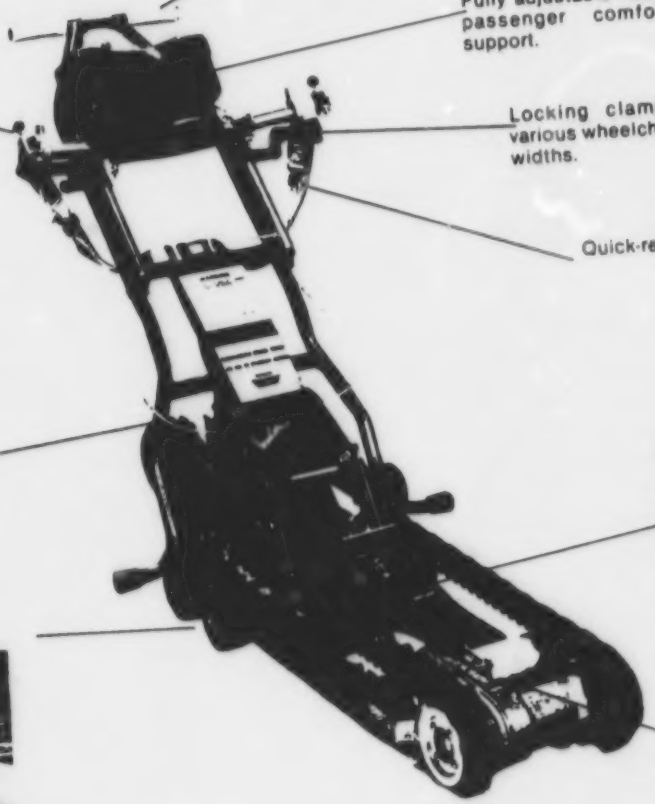
Wheelchair frame is attached securely to Stair-Trac with adjustable locking clamps.



Removable wheelchair support handle features a double safety latch and guarded release mechanism. Note key switch to control unauthorized use.



Tandem wheels are permanently attached making turning corners and wheeling over long, flat surfaces easy.



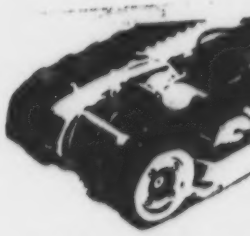
Control switch, located between hand grips, requires constant thumb pressure.

Fully adjustable headrest for passenger comfort and support.

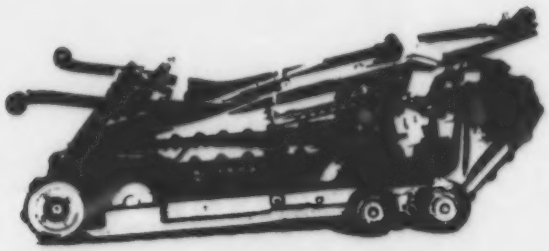
Locking clamps adjust to various wheelchair heights and widths.

Quick-release safety belt.

Power source is 12V recharg able, gel-cell battery. No quick disconnect plug for b tery charger.

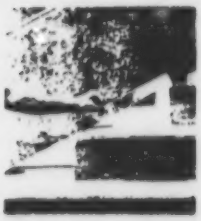


Steel-belted rubber tracks sure secure grip on stair Motor and gearbox are m tenance free.

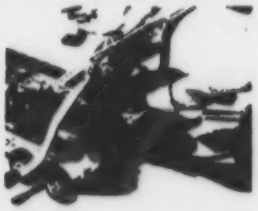


Folds down in seconds for storage and/or transpor tation. Stair-Trac fits easily into most car trunks.

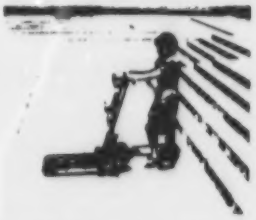
STAIR-TRAC is easy to operate!



1. Use slope indicator supplied to measure stair angle.



2. Release safety latch on wheelchair support handle.

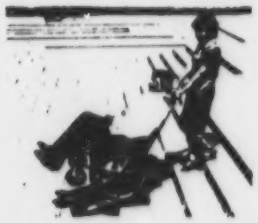


3. Lift wheelchair support handle to upright position.

4. Passenger positions wheelchair over rubber tracks.

5. Operator locks wheelchair to support handle and adjusts safety belt.

6. Slowly tilt back wheelchair support handle until safety latch clicks into locked operating postion.



7. Position Stair-Trac at 90° to stairway. Push operating switch to right and hold. Stair-Trac will now climb the stairs under its own power.

Loading Stair-Trac, as shown in this sequence, normally takes an experienced operator less than a minute!

BENEFITS

- Immediately available. Solve access problems in days.
- Economical compared to fixed lifts and elevators.
- No installation complication nor expense.
- Preserve building appearance. Stairway modifications and/or fixed structures not required.
- Code and permits not required.
- Easily stored in locked room to eliminate vandalism and tampering.
- Use a single Stair-Trac to solve many access problems.
- Standard universal design keeps resale value high compared to custom fixed lifts.
- Reliable performance and minimal maintenance due to simple yet substantial design.
- Versatile. Use as a van lift, for carrying ambulatory people, or carrying heavy freight.
- Battery power means Stair-Trac operates even in the event of a power failure.

APPLICATIONS

- Indoors or Outdoors
- Private Homes
- Schools
- Churches
- Hotels & Restaurants
- Rec. Centres
- Offices
- Travelling

...and portable!

Loading into a car or van is easy using the optional loading ladder. Lifting is not required.

An optional adaptor allows convenient charging from the cigarette lighter.

STAIR-TRAC is proven!

Currently in use by hundreds of schools, churches, corporations and individuals in North America, Stair-Trac has proven itself as an economical problem-solver.

"The device is an ingenious solution to our problem of an ill-designed, multi-level church building."
First United Methodist Church

"Stair-Trac was the solution to our accessibility problems in regard to our high school buildings."
Stubenville Board of Education

"...with the new Stair-Trac portable wheelchair lift, students in wheelchairs have complete access to the entire school."
Parkview Junior High School

"It fits our needs like you had us in mind when you designed it."
St. Paul United Methodist Church

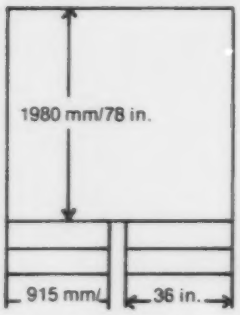
"It is most definitely a very worthwhile investment."
Wood County Board of Education

"For our church, it's (an inexpensive) solution to a $50,000 problem. We're thrilled!"
Fairlawn United Church

AMBULATORY SEAT

The Ambulatory seat adds versatility to Stair-Trac, enabling it to be used to carry people who are not in wheelchairs but require assistance on stairways.

STAIRWAY CLEARANCES



This is a guide of typical clearances required to maneuver Stair-Trac around turnback stairways. Clearance dimensions vary with stairway width, passenger size and operator experience.

Wheelchair loading and unloading requires a minimum straight line length of approximately 3050 mm/120 in. Stair-Trac can be loaded and unloaded away from the stairway, and wheeled into the operating area using the auxiliary wheels.
Consult Garaventa or your local representative for clearance verification.

SPECIFICATIONS

Load Capacity		130 kg/286 lbs
Power Capacity (with full load)		650 Stairs
Dimensions Assembled:	Height	888 mm/35 in
	Depth	1473 mm/58 in
	Width	610 mm/24 in
Dimensions Storage:	Height	330 mm/13 in
	Depth	1040 mm/41 in
	Width	610 mm/24 in
Weight: Drive Frame		34 kg/75 lbs
Wheelchair Support Handle		13 kg/29 lbs
Battery		8 kg/18 lbs
Total		55 kg/121 lbs
Batteries (gel-cell)		2X6V - 20 AH
Charge Rate (maximum)		4 amp
Motor		12 VDC
Speed: Up Stairs		6.5 m (21 ft)/min
Down Stairs		7.7 m (25 ft)/min
Optimum Stair Angle		35°

OPTIONS

- Cigarette Lighter Adaptor
- Loading Ladder
- Ambulatory Seat
- Spare Battery

TOLL FREE
(800) 663-6556

For more information and the location of your nearest Garaventa representative, call toll free from anywhere in Canada and the U.S.A. (except Alaska and Hawaii).

REPRESENTATIVE:

CANADIAN PATENTS: 1147772, 1219013 U.S.A. PATENTS: 4432426, 4566550

7505 - 134A Street, Surrey, B.C.
Canada V3W 7B3
Phone: (604) 594-0422
Telex: 04-55763
Fax: (604) 594-9915

For faster service in USA.
Please use USA mailing address.
Garaventa (Canada) Ltd.
P.O. Box L-1
Blaine, WA 98230

© 1989 GARAVENTA CANADA INC.

LITHOGRAPHED IN CANADA

14420/GAR
BuyLine 0681

AS WE SEE IT . . .

We all cherish mobility. We want to be independent; we want to be able to move from place to place as we wish.
But for someone with a physical disability this mobility may be restricted, particularly in multi-storey buildings where stairways can be a barrier.
As we see it, the Garaventa Stair-Lift removes this barrier, providing disabled people with a freedom others take for granted.
To us the Garaventa Stair-Lift is much more than a wheelchair lifting device; it's a means of providing disabled people with mobility and independence, and the feeling that's reflected here in their faces and in their smiles.

"It's fun to use, and lets me get around the school to be with my friends."

"Now I can do lots of things with my class."

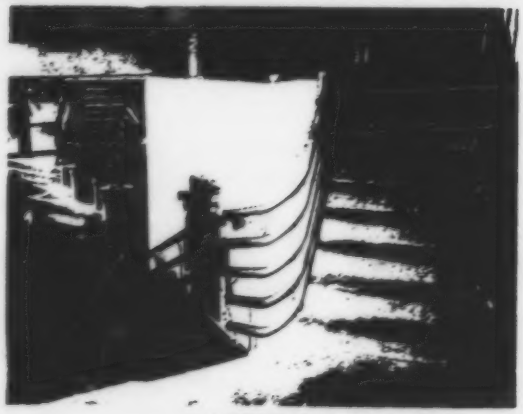
"This lift's great! It makes everything easier and has opened up a lot of new areas for me."

SUPERVISED operation by an attendant may be desirable in some situations, and in others it may be required by code.

COVER: The Garaventa Stair-Lift complements attractive interiors, such as the display area of the Discovery Building at the British Columbia Enterprise Center, Vancouver, B.C.

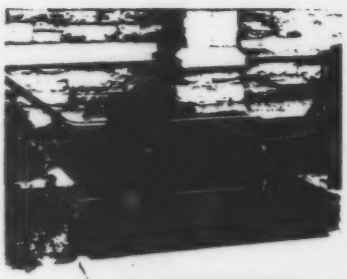
THE CHOICE OF ACCESSIBILITY PLANNERS

CUSTOM DESIGNED to suit your needs. Whether your access problem is caused by curved or straight stairways, a few steps or a completely inaccessible multi-storey building, we can design and build a Stair-Lift meeting your requirements. But custom design means more than the ability to follow any stairway configuration. It means creating attractive lifts, no matter what the application. And for a fraction of the cost of a conventional elevator.



VERSATILE. Architects designing Florida's exclusive Boca Raton Club chose the Garaventa Stair-Lift for disabled members and guests. The system also provides a functional and visually appealing handrail.

LANDMARKS. The USS Arizona Memorial in Pearl Harbor required a reliable access system in a confined area with a corrosive salt-air environment. Garaventa met the challenge.

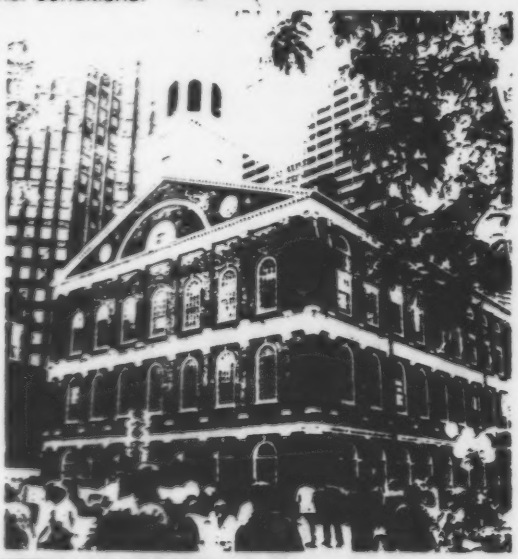


OUTDOORS, attractive stainless steel tubes and durable powder paint finishes stand up to harsh weather conditions.

THE TEST OF TIME. The consistent choice of architects and building managers since 1978, Garaventa Stair-Lifts offer daily access at more than 1600 installations around the world. No other inclined wheelchair lift reflects this degree of experience.

Garaventa Stair-Lifts are at home in small towns and big cities, in schools, churches, courthouses, and all types of public and private buildings. Many Stair-Lifts are installed in prominent locations, including:

United Nations Building, New York
Hearst Castle, San Simeon, CA.
Maid of the Mist, Niagara Falls, N.Y.
Royal York Hotel, Toronto, ON.
Iolani Palace, Honolulu, HI.
Seoul Subway Station, Seoul, Korea
Parliament Buildings, Canberra, Australia
University of Alaska, Fairbanks, AK.

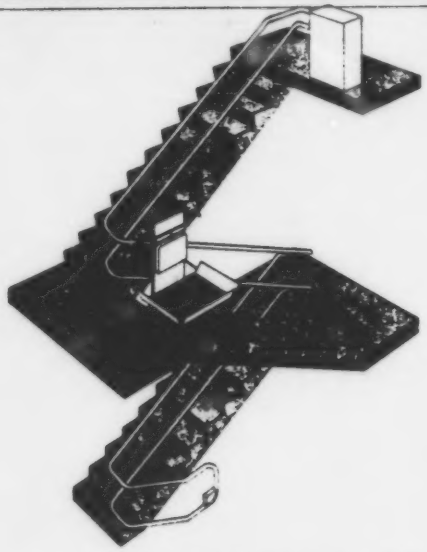


HERITAGE PRESERVATION the Garaventa way means little or no modifications to the appearance of such historic sites as Boston's Faneuil Hall, built in 1742.

COMPLEMENTING modern architecture. Stair-Lifts can be designed to blend with the character of any new building, such as the Discovery Building at the British Columbia Enterprise Center.

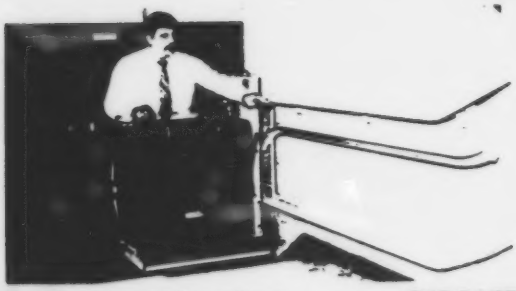
MODEL GSL-1
FOR TURNING STAIRWAYS

MODEL GSL-1. The key feature of the GSL-1 is its use of parallel steel support tubes and unique drive system to handle turning stairways. The attractive, elegant design and aesthetic appearance of the GSL-1 blend with the finest setting. Created in a three-dimensional configuration, the tubes follow any stairway. A single GSL-1 system can ascend up to 3 full storeys, stopping like an elevator at each floor to provide total building access.



TOTAL ACCESS SYSTEM. The GSL-1 and GSL-2 use t same wheelchair platforms, control panels and keys, an are available in the same ran of colors and finishes. This simplifies training and ensur user familiarity if both model are needed in a single buildi

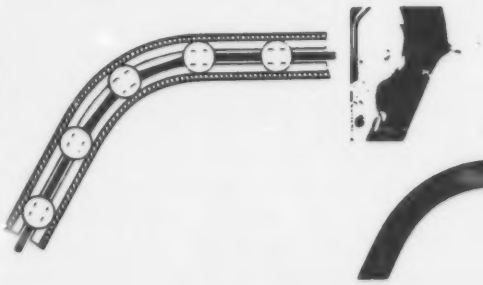
CODE COMPLIANT. All Garaventa Stair-Lifts meet exceed the ANSI A17.1 an CSA B355 codes and standards for public-buildin wheelchair lifts.

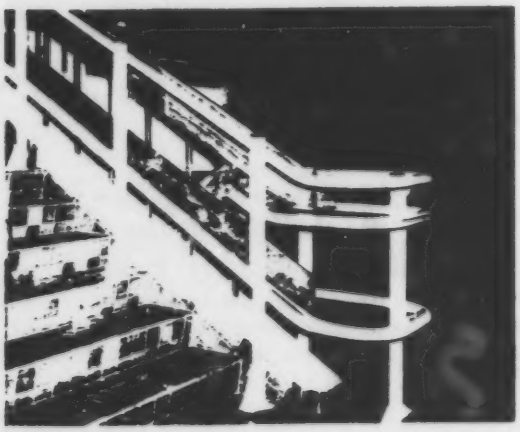


ON HORIZONTAL LANDINGS a third tube is used to ensure smooth platform travel. This unique feature allows the GSL-1 to follow complex stairways with numerous horizontal sections.

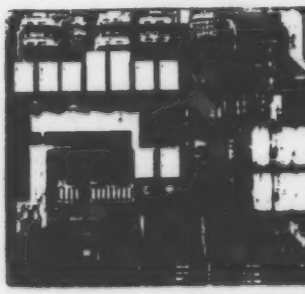
SUPPORT TUBES may be located on either side of straight stairways, but are fitted only to the central core of turning stairways. In most cases they can be attached directly to walls of concrete or other strong materials (above). For open stairways, or where walls are built of weaker materials, support tubes are mounted on custom-designed support towers (below).

THE PATENTED DRIVE System gives the GSL-1 its unique character. A special wire rope fitted with plastic guides travels inside the support tubes and moves the wheelchair platform up and down the stairway.

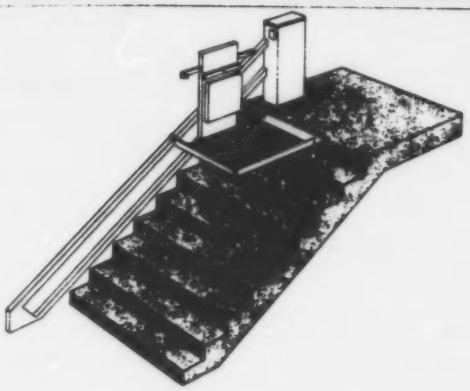




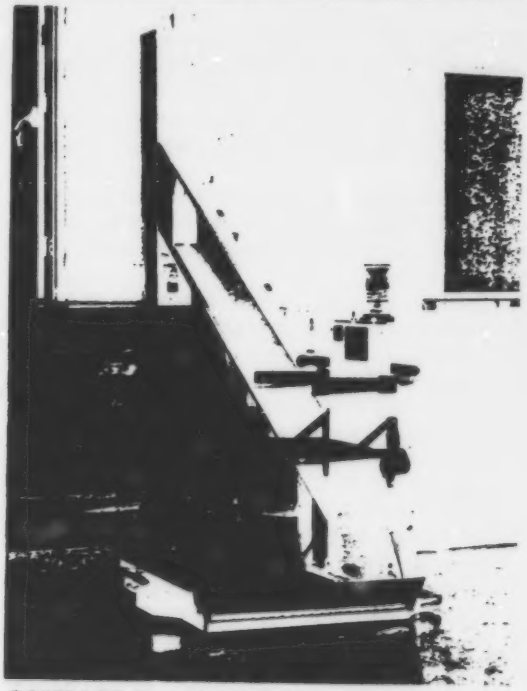
THE INTELLIGENT CONTROL SYSTEM (ICS™) provides a sophisticated electronic control system that simplifies wiring and reduces installation and service time.



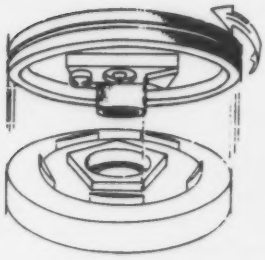
MODEL GSL-2
FOR STRAIGHT STAIRWAYS



MODEL GSL-2. When straight stairways without intermediate landings prevent access, Garaventa's GSL-2 is the answer. The GSL-2 uses the same wheelchair platform as the GSL-1, but incorporates a different drive system and a C-Channel support rail which is extremely cost-effective for this type of application. Depending on wall construction, the rail can attach directly to the wall or be supported by towers.(Lower left of previous page).



COMPACT. The GSL-2 System occupies minimal space on straight stairways.

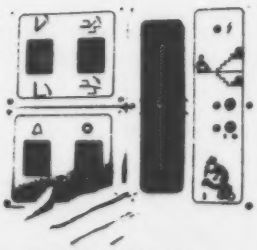


PASSENGER SAFETY is Garaventa's prime consideration. Safety mechanisms such as the overspeed brake are an integral part of Stair-Lift design.

EASY TO USE

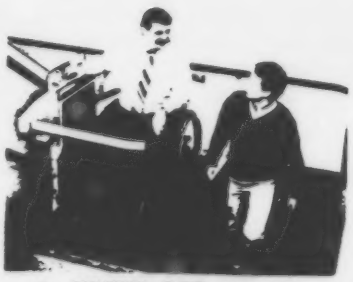
Controls designed with the disabled user in mind allow ease of operation and promote independent access.

1. **CALL THE PLATFORM** to your floor by using the key-activated wall-mounted call station.



2. **WHEEL ON.** When the platform arrives, fold it down, lower the ramp and wheel on, setting your wheelchair brake and folding up the ramp. If you're not in a wheelchair you can use the optional seat.

3. **PRESS THE SWITCH.** Continuous pressure on the directional switch moves the platform up or down as required. The platform automatically slows around corners and its compact size presents minimal stairway obstruction for passers-by.



4. **WHEEL OFF.** The platform stops automatically at each floor. When you arrive at your desired floor, fold down the loading ramp, wheel off, and fold up the ramp and platform.

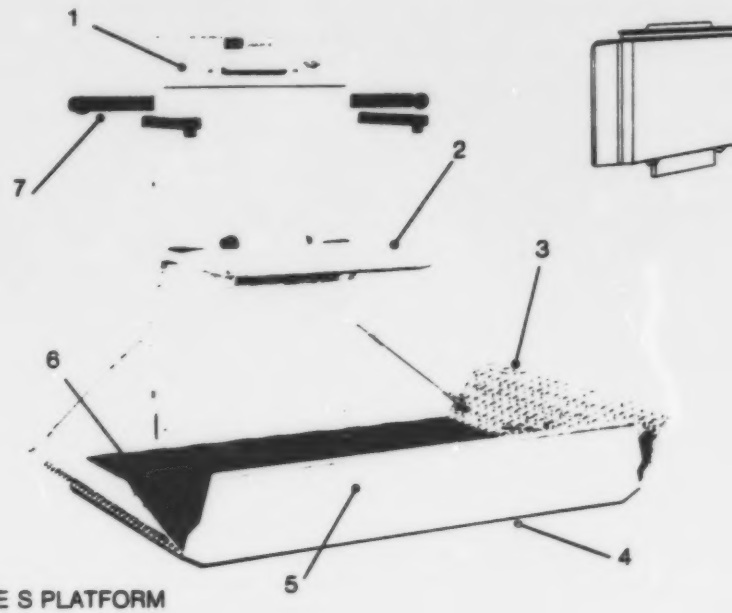
GSL-1 / GSL-2 PLATFORM

SETTING THE STANDARD. Garaventa continues to set the standard of excellence for inclined wheelchair lifts. Innovative electronic technology and advanced features add up to the highest standards of safety, reliability and durability.

Three platform types meet the needs of any customer. Optional features can be field-installed by your local dealer at a later date.

Platform features:

1. Controls are within easy reach of the user.
2. Seat, with seat belt and armrests, is optional on all platforms.
3. Touch-sensitive ramps will stop the lift if the wheelchair rolls against them or if an obstruction is encountered.
4. Touch-sensitive plate under the platform will stop the lift if an obstruction is encountered.
5. Six-inch-high sidewall provides security for the user, and forms the Vandal-Stop™ feature that protects the controls when the platform is folded.
6. Non-skid deck surface.
7. Actuation bar to manually raise or lower ramps (Type S only).



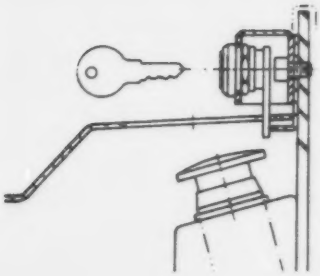
TYPE S PLATFORM

REDI-LAMP™. A standard feature, this LED lamp on the control panel signals that safety circuits are clear and the lift is ready to be operated.

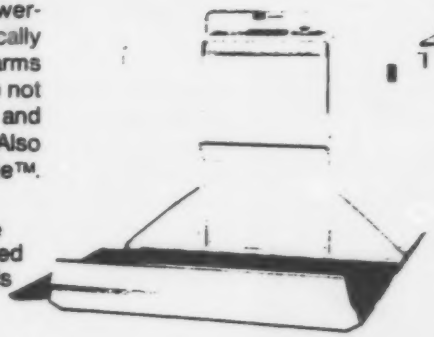
DEK-LITE™, available on all platforms equipped with the optional seat, illuminates the platform area for additional safety.

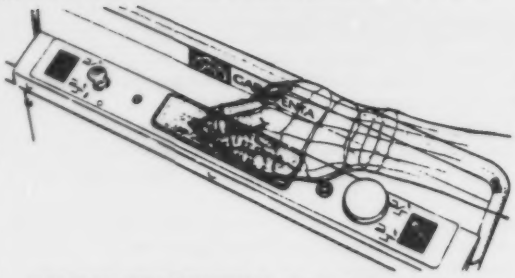
TYPE SP PLATFORM. In addition to all standard safety features, the Type SP platform includes Power-Fold™ and Power-Ramp™, which electrically raise and lower the platform and ramps.

TYPE SPE PLATFORM. Along with all standard safety features, the Type SPE Platform includes Power-Fold™, Power-Ramp™, and Bar-Guard™ electrically operated safety arms. The Bar-Guard™ arms open only at designated landings. When not in use, they are fully concealed and protected by the folded platform. Also shown are the optional seat and Dek-Lite™.



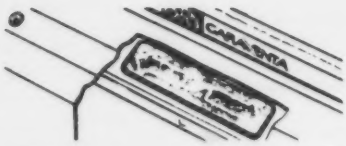
PLATFORM LOCK. This optional feature allows all Garaventa platforms to be locked in a folded position, securing the controls and platform from unauthorized use.

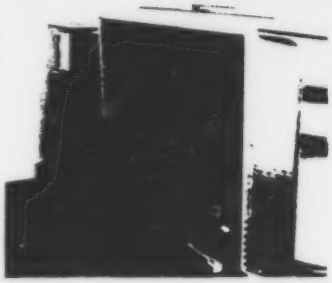




HUMAN ENGINEERING. Large, easy-to-use Touch-Pow'r™ controls, activated by constant pressure, are designed for people with a broad range of disabilities.

VANDAL PROTECTION. All platforms include the Vandal-Stop™ feature. When the platform is folded, a protective plate covers the controls and safeguards them from damage.





COMPACT STORAGE. The platform folds to leave the stairway virtually unaffected, and may be stored on a landing away from the stairs if building design permits.

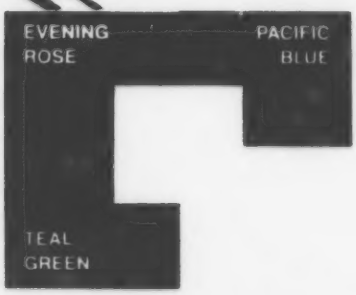
ATTENDANT OPERATION. Supplied as standard equipment, a hand-held control unit allows an attendant to walk beside a moving platform and control its operation.

AUDIO-VISUAL ALERT. An optional chime and strobe light system, mounted on the wall, indicates that the lift is in use.

FINISHES

POLISHED STAINLESS STEEL tubes are available on model GSL-1 Stair-Lifts. They are attractive indoors, and tough and durable outdoors in the face of weather and vandalism.

COLORS. Four standard designer colors in a tough powder paint blend with the decor of most buildings. Color selections apply to tubes or channel, support towers, drivebox and the underside of the platform. The remainder of the platform is finished in Cool Grey, a neutral modifier that emphasizes the designer color. Custom colors of your choice are also available.



GARAVENTA STAIR-LIFT FEATURES	MODEL GSL-1	GSL-2
Follows Straight Stairways	●	●
Follows Curving Stairways	●	N/A
Horizontal Travel	○	N/A
C-Channel Rail	N/A	●
Tubular Rail	●	N/A
Remote Drive Box Location	○	N/A
Multiple Stops (>2)	○	N/A
Integrated Handrailing	○	○
Integrated Ballustrade	○	N/A
Choice of Standard Colors	●	●
Custom Match Colors	○	○
Stainless Steel Finish	○	N/A
Outdoor Installation	○	○
Presentation Drawings	●	●
Full Electrical Schematics	●	●
Final Limit Switches	●	●
Overspeed Safety Device	●	●
Emergency Stop Switch	●	●
Attendant Hand Control	●	●
Attendant Call Stations	○	○
Keyed Call / Send Stations	●	●
ICS™ Intelligent Control System	●	●
Slowing in Corners	●	N/A
Smooth Start / Stop	●	N/A
Low Voltage Controls (24V)	●	●
Audio Visual Alert	○	○
Emergency Manual Lowering	●	●
Drive Box Cover Lock	●	●
Emergency Evacuation Chair	○	○
Off-Stairway Platform Storage	○	N/A
Vandal-Stop™ Protection	●	●
Redi-Lamp™ Safety Indicator	●	●
Underplatform Sensing	●	●
Underhanger Sensing	●	●
Bi-Directional Ramp Sensing	●	●
Seat, Armrests and Seatbelt	○	○
Dek-Lite™ (requires seat)	○	○
Folded Platform Security Lock	○	○
Passenger Grab Rail	○	○
Emergency Remote Alarm System	○	○
Protective Platform Cover	○	○
Side-Load Platform	–	–
Power-Fold™ Platform	–	–
Power-Ramp™	–	–
Bar-Guard™ Safety Arms	–	–

KEY:	STANDARD	OPTIONAL
All Platforms	●	○
Type SP Only	–	–
Type SPE Only	–	–
Not Available	N/A	N/A

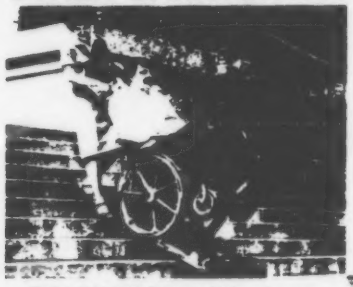
GSL-1 SPECIFICATIONS

PLATFORM: Standard size of platform deck 760mm (30 in) by 1050 mm (41 in). Power-Fold™, Power-Ramp™, safety arms and seat optional.
RATED LOAD: 205 kg. (450 lbs).
SPEED: Travel speed 6 meters (20 ft) per minute. Slows in corners.
TUBES: Two 50mm (2 in) O.D. mild steel tubes spaced approx. 600mm (24 in) apart vertically. The lower tube is approx. 400mm (16 in) above stairs, varying with slope of stairs. Tubes project approx. 130mm (5 in) from attachment wall.
MOTOR: 1 H.P. direct current. 180 volt. Mains power requirement 208 VAC 3 phase or 208/220/240 VAC 1 phase.
DRIVE CABINET: Located at top of system. Measures 1050mm (42 in) high by 585mm (23 in) wide by 245mm (10 in) deep. Hand wheel allows operation during power failure.
OVERSPEED SAFETY: Located at bottom of system. Mechanical over-speed sensor and lock with electrical drive protection.
WIRE ROPE: 8mm (0.31 in) galvanized steel core. Breaking load 4300 kg (9460 lbs).
ELECTRICAL CONTROLS: All operating controls are 24 volt.
STAIRWAY CLEARANCE: Straight stairways require a minimum width of 1030mm (41 in), with turning section approx. 1170mm (46 in).
FINISH: Standard finish is baked powder paint in choice of four colors. Custom colors available in two-component urethane finish. Tubes and supports available in stainless steel.
WARRANTY: Limited one-year warranty.
NOTE: *Specifications are subject to change without notice.*

GSL-2 SPECIFICATIONS

PLATFORM: Standard size of platform deck 760mm (30 in) by 1050 (41 in). Power-Fold™, Power-Ramp™, safety arms and seat optional.
RATED LOAD: 205 kg. (450 lbs).
SPEED: Travel speed 6 meters (20 ft) per minute.
RAIL: Steel. Offset C-Channel. 400mm (15.7 in) by 60mm (2.4 in).
MOTOR: 1 H.P. at 1725 rpm, 208 VAC 3 phase or 208/220/240 VA phase.
DRIVE CABINET: 280mm (11 in) wide by 180mm (7 in) deep by 137 (54 in) high. Handwheel allows operation during power failure.
OVERSPEED SAFETY: Overspeed governor and brake with electrical protection.
ROLLER CHAIN: Double roller chain meets ANSI specification B-29.2
ELECTRICAL CONTROLS: All operating controls are 24 volt.
STAIRWAY CLEARANCE: 1016mm (40 in) minimum required.
FINISH: Standard finish is baked powder paint in choice of four colors. Custom colors available in two-component urethane finish.
WARRANTY: Limited one-year warranty.
NOTE: *Specifications are subject to change without notice.*

OTHER GARAVENTA PRODUCTS



STAIR-TRAC™. A portable wheelchair lift, Stair-Trac™ allows an attendant to transport a disabled person up and down stairways. Safe, easy to use, and very affordable!

EVACU-TRAC™. Why leave emergency egress to chance? Evacu-Trac™, the most effective emergency evacuation chair available, moves injured or disabled people quickly and safely.

.....AND SERVICES

ARCHITECTS AND PLANNERS

A comprehensive Stair-Lift Design and Planning Guide, as well as a design service, are available at your request.

LEASING OPTIONS

If budgets are a concern, consider leasing your Garaventa product. Ask about our attractive leasing options that offer short-term or long-term financing at competitive rates.

CALL US TOLL FREE

For more information and for the location of your nearest Garaventa representative, call toll free from anywhere in Canada and the USA (except Alaska and Hawaii).

(800) 663-6556

U.S.A. PATENT 4179012 CANADIAN PATENT: 1067443, 108486

GARAVENTA (CANADA) LTD.
7505 - 134A Street, Surrey, B.C.,
Canada V3W 7B3
Phone: (604) 594-0422
Telex: 04-55763 Facsimile: (604) 594-9915

Garaventa (Canada) Ltd.
P.O. Box L-1, Blaine, WA 98230 USA

CAPITAL ELEVATOR LTD.
21 ANTARES DR. UNIT 205
NEPEAN, ONTARIO
K2E 7T8
PHONE (613) 723-0732
FAX (613) 723-2917

© 1988 GARAVENTA (CANADA) LTD.

LITHOGRAPHED IN CAN

APPENDIX D

CANADA SHIPPING ACT
SHIPS' ELEVATOR REGULATIONS

CANADA SHIPPING ACT

Ships' Elevator Regulations

REGULATIONS RESPECTING ELEVATORS IN SHIPS

Short Title

1. These Regulations may be cited as the Ships' Elevator Regulations.

Interpretation

2. In these Regulations,

''competent person'' means an elevator inspector employed as such in Canada by a provincial government or a company engaged in the manufacture of elevators or escalators that meet the requirements of the C.S.A. Code;

''C.S.A. Code'' means the Canadian Standards Association Code B 44 entitled Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks;

''inspector'' means a steamship inspector appointed pursuant to Part VIII of the Canada Shipping Act.

Application

3. These Regulations apply to elevators and escalators that are used primarily to carry persons, and that are installed on Canadian ships or ships engaged in the coasting trade of Canada.

Elevators and Escalators

4. (1) The design, construction, installation, inspection, testing and alteration of every elevator or escalator shall comply with the applicable provisions of the C.S.A. Code that was in force at the time that the elevator or escalator was installed except that elevators or escalators installed after January 1, 1970 shall comply with C.S.A. Code B 44-1975.

(2) When an inspection of elevators or escalators is performed by a competent person, the owner of the elevator or escalator shall provide the inspector with a document duly signed by the competent person that states that the elevator or escalator complies with the provisions of the applicable C.S.A. Code.

Established by the CONSOLIDATED REGULATIONS OF CANADA, 1978.

APPENDIX E

DRAFT - "BARRIER FREE DESIGN STANDARDS FOR FERRY SERVICES" MARINE POLICIES AND PROGRAMS

D R A F T

BARRIER FREE DESIGN STANDARDS FOR FERRY SERVICES

MARINE POLICIES AND PROGRAMS

NOVEMBER 18, 1986

Definitions 1

- Disabled Person
- Marine Operating Company
- Ship
- Distinction - New & Existing Ships
- Review Committee

Discrimination 2

Information Services 2

- Emergency Alarms
- Staffing Services

Access to Ship 4

- Boarding - Deboarding

Doors and Entrances 4

Stairs 5

Elevator 5

Handrails 7

Tactile cuing for blind or vision impaired persons 8

Washrooms and Toilet Stalls 9

- Toilets
- Other Equipment

Cafeteria 12

Rest Areas 12

Cabins 13

- estimated conversion costs;
- useful life expectancy;
- impossibilities to offer services;
- clientele;
- duration of voyage.

1.4 Review Committee

There must be an ongoing process of development, monitoring and re-evaluation of the accessibility standards. The mandate of the Committee shall be to keep under review, by meeting twice a year, all ferry accessibility standards in existence.

The proposed body shall represent those most directly concerned. Membership should include representatives of at least the following: Transport Canada; Canadian Human Rights Commission; at least two disabled consumers representing national organizations; each Marine Operating Company.

2. Discrimination

Marine Operating Companies shall provide, in standing orders, direction to their operating personnel ensuring disabled persons are not refused carriage because of their handicap.

3. Information Services

3.1 Marine Operating Companies shall publish a list of services offered on board each ship, including services to disabled persons.

3.2 Ships shall have the necessary equipment to inform passengers of schedules and other information necessary to meet the needs of all travellers including those suffering from a visual or hearing disability.

3.2.1 The above information shall be available both audibly and visually.

3.2.2 On passenger decks, signs shall be placed a minimum height of 1.2m and a maximum height of 1.6m measured vertically from the deck.

3.2.3 All sign colours shall be selected on the basis of contrast clarity (4.2.2).

3.2.4 Where video screens are used, the video display shall complement the public address system, using large print where possible.

3.2.5 A bold face type shall be used in the creation of signs. The size of print should be determined by the distance of readibility.

3.2.6 The Internatinal Symbol foç Accessibility shall be posted to indicate accessible facilities within a vessel.

3.2.7 The International Symbol for the Hearing Impaired shall be posted to indicate facilities accessible to deaf persons.

3.3 Emergency Alarms

3.3.1 Audible emergency alarms shall produce a sound level exceeding the prevailing ambient sound level by at least 15 decibels, or exceed by 5 decibels any existing peak sound level having a duration of 30 seconds, whichever is louder. Alarm signal sound levels shall not exceed 120 decibels.

3.3.2 In main public areas and public washrooms and designated cabins, visual emergency alarms shall automatically flash upon activation of an audible emergency alarm. The flashing frequency of visual alarm devices shall not exceed 2Hz. These shall be installed on the same circuit as audible emergency alarms.

3.4 Staff Services

3.4.1 Marine Operating Companies shall prepare and implement a training program in consultation with disabled persons and organizations of disabled persons in the area and shall ensure that all employees involved in providing services to the public aboard the ships shall receive an adequate training and awareness program on the needs of disabled persons on an ongoing basis.

3.4.2 All travellers shall be considered self-reliant by the ship's crew unless the traveller requests assistance.

4. Access to Vehicle Carrying Ships

4.1 Boarding - Debarking

4.1.1 Disabled persons' vehicles shall arrive at the terminal in ample time to be placed in an area permitting timely boarding in order to occupy designated spaces. (See section 4.1.2.) When and where reservations can be made, disabled persons can use those services to reserve such spaces.

4.1.2 Vehicles transporting disabled passengers who have identified themselves to the Marine Operating Company, shall be parked as close as possible to the elevator or staircase leading to the passenger deck.

4.2 The parking area for the vehicles of disabled passengers shall be identified with adequate signs, as follows:

4.2.1 The Internatinal Symbol of Accessibility shall be posted to indicate accessible facilities; an arrow can be added to indicate the location of an accessible facility.

4.2.2 All colours shall be selected on the basis of contrast clarity; orange, yellow and green are more easily distinguished by colour blind individuals than are blue, red and violet. Letters and symbols on signs shall be properly contrasted preferably light on dark with low reflecting background (avoid yellow on black, yellow on green, green on blue, red on green and green on red).

5. Doors and Entrances

5.1 Designated doors and entrances shall provide sufficient space to manoeuver a wheelchair on both sides of the door and be clearly identified as to location.

5.2 A threshold between compartments on passenger decks shall not exceed a height of 13mm or be bevelled at a greater than 30° angle.

5.3 All manual doors shall operate at a minimum pressure not exceeding 40 newtons.

5.4 All doors having a latch-type release mechanism shall be operated by horizontal levers or vertical handles and in no case shall a knob-style latch be used.

5.5 If equipped with an automatic closer, doors shall remain fully open at least 5 seconds.

6. Stairs

6.1 The top, outer edge of each step shall be marked by a contrasting colour strip which has a minimum width of 25mm (see 9.1).

6.2 Handrails shall be provided on both sides of all steps and staircases and be of contrasting colour. They should be located at a maximum height of 900mm from the step nosing. (See Section 7 for further details.)

6.3 Handrails should turn into the wall to signal the end of the staircase; they should not be interrupted where two portions of a staircase are divided by a landing.

6.4 The minimum lighting standards for all staircases shall be 50 lux at floor level and 300 lux over all grade changes.

6.5 Step surfaces shall be firm and of non-slip construction.

6.6 The architecture of the stairs shall be uniform and consistent and shall not constitute a hazard for blind or vision impaired persons.

6.7 Spiral staircases shall be avoided.

7. Elevator

7.1 The elevator leading to the passenger deck shall be served by a parking area where the International Symbol for Accessibility shall be posted.

7.2 a) The minimum inside dimensions of any elevator shall be 1.40m X .75m.

b) The minimum clearance required when the elevator door is in a fully open position is 810mm.

c) All buttons of the elevator control panel shall be located between heights of 840mm and 1.40m measured vertically from the floor of the elevator car.

d) The maximum distance between the car platform sill and the shaft edge shall be 15mm.

e) At least two handrails shall be provided in each elevator car. Three handrails,shall be provided in elevator cars which have only one door. All handrails approximately 840mm, measured vertically from the car floor. Handrails shall have a clearance of 40mm between the inner edge of the rail and the wall of the elevator car.

f) The operation of all elevators shall be automatic.

g) The minimum time for elevators doors to remain fully open in response to a call shall be 3 seconds (preferably 5 seconds). Open time may be interrupted through the use of the door closing button.

h) The elevator shall be equipped with an automatic self leveling device. Elevator doors shall be provided with an automatic reopening device which will stop and reopen an elevator car door and the adjacent hoistway door automatically if the doors encounter an obstruction while closing. Two electric eyes, located at the heights of 100 to 140mm and 725 to 750mm, shall be used as a reopening device or any equivalent device.

i) The elevator car shall contain an indicator to provide a visual and tactile signal showing the current position of the car. A complementary audible signal is highly recommended.

j) Control buttons used to direct an elevator car to a given floor shall be lettered in Arabic numerals. Extradirectional control buttons (i.e. buttons used to initiate door closing, door opening, emergency stop, etc.) shall be identified by lettering or pictograms or both. All lettering and symbols shall be displayed beside the button and raised or recessed a minimum of 1mm. Minimum size of buttons shall be 18mm. Heat sensitive control buttons should not be used.

k) The floors in all elevator cars shall have a non-slip surface.

l) Emergency door operating controls shall be located at the base of the control panel, where they will be within easy reach of all travellers.

m) To facilitate the viewing of the floor numbers, mirrors should be erected at the back of the elevators.

n) The elevator shall have: plate markers with raised arabic numerals and braille; door jams with raised arabic numerals and braille plates and buttons to call the elevator with raised arrows and braille plates.

8. Handrails

8.1 So as to facilitate the movement of disabled persons on board the ship, the stairways and corridors must be provided, on each side, with handrails of contrasting colours.

a) The upper surface of all handrails shall have a height ranging between 800mm and 920mm (840mm preferred), measured vertically from floor or ramp surfaces, or from the outer edge of steps.

b) All handrails shall be round and smooth, and have exterior diameters ranging from 32mm to 45mm.

c) All handrails shall have a clearance of 40mm between the wall surface and the inner edge of the rail to facilitate a firm handhold.

d) Handrails shall be extended for a distance of 450mm beyond the top step of all stairways. Handrails shall be extended a minimum 300mm beyond the tread length at the bottom of all stairways. If the handrail is continuous, such extensions shall not be required.

e) Where the width of a ramp or staircase exceeds 2.2m, one or more handrails must divide the width. The distance beetween handrails bounding stairs or ramp shall not exceed 1.65m.

f) Any handrail shall have sufficient strength to sustain a force of 1.25 kilonewtons in any direction at any point without flexing.

g) Under no condition shall the side or the top of the gripping surface of a handrail be interrupted by newel posts. Handrail supports shall be widely spaced to prevent unnecessary breaks in the grip.

h) Handrails shall be placed on both sides of staircases.

i) Handrails shall be continuous along the inside of dogleg or switchback stairs. Where possible, handrails shall also be continuous along the outside of such stairs.

j) Textured strips shall be used as cues for the blind and vision impaired on all handrails (see 9.1).

k) Handrails shall be finished in colours which contrast distinctly with their environs.

9. Tactile cuing for blind and vision impaired persons

9.1 Warnings for the blind and vision impaired shall be four-way: on handrails, floors, walls and doors.

a) A roughened handrail surface may either be an integral part of or permanently applied to the handrail surface. Vinyl strips are recommended as a permanent application material. Whether innate or applied, the warning shall consist of strips 5mm in width running along the handrail surface at right angles to the path of travel. Strips shall be separated by a minimum distance of 5mm and shall endure for a distance of 750mm just prior to the potential hazard.

b) Any handrail which bounds a ramp, staircase or corridor leading to an emergency exit shall be equipped with tactile signals as described in paragraph 9.1.(a).

c) Where possible, tactile warning signals shall be placed on walking surfaces immediately prior to the ramps, staircases and doors. These signals should be designed to be easily detectable by a person's cane and/or feet. They should consist of non-skid strips

running at right angles to the path of travel. Each strip should be between 25mm and 50mm wide, and be 3mm high. Strips should be separated by gaps which measure between 6mm and 20mm in width. Strip length should equal staircase and/or ramp width. The strips should be provided at the top and bottom of each staircase and ramp and should endure for a distance ranging between 600mm and 900mm parallel to the path of travel.

d) No other walking surface on the site or in the building shall have the same pattern as the tactile signal pattern described in (c). Care should be taken to select strip material which the blind may easily perceive as differing in texture and hardness from the surrounding floor.

9.2 Federally approved skid-proof materials must be used on the stairways and corridors. If carpeting is used, it must be securely attached, have a firm underpad or no underpad and a maximum pile height of 13mm.

10. Public Washrooms and Toilet Stalls

10.1 At least one toilet (one for men and one for women or a unisex toilet) shall be adapted to the needs of disabled persons and must be wide enough to accommodate those in wheelchairs.

10.1.1 Accessible toilet stalls shall have a minimum width of 1.4m and a minimum depth of 1.52m.

10.1.2 Doors to accessible toilet stalls shall swing outwards. They shall have a clearance width of 810mm when in a fully open position.

10.1.2.1 The door of an accessible toilet shall be provided with a door pull on the inside located so that the center line is between 200mm and 300mm from the hinged side of the door, and be provided with a door pull on the outside near the latch side of the door.

10.1.2.2 The center line of the water closet shall be located 450mm away from an adjacent side wall supporting a grab bar.

10.1.2.3 A minimum distance of 900mm shall separate the centre line of the water closet from the other side wall.

10.1.2.4 The minimum clearance between washroom walls/doors and any screen located outside the washroom shall be 1.2m away from washroom doors.

10.1.2.5 The diameter of grab bars shall be between 30mm and 45mm. A minimum clearance of 40mm shall separate the grab bar from the wall. At least one such grab bar with a minimum length of 1m (1.22m preferred) shall be mounted at the side of the water closet by an approximate distance of 400mm, and shall be located at an approximate height of 800mm measured vertically from the floor surface. The innermost end of this grab bar shall be located a horizontal distance of 300mm from the rear wall. All grab bars shall be sufficiently strong to sustain a weigh load of 1.3 kilonewtons and be removable.

10.1.2.6 A coat hook with rounded edge shall be mounted on a side wall a height of 1.5m measured vertically from the floor surface. It shall have rounded edges, and shall not project more than 25mm from the wall.

10.1.2.7 The construction of toilet stalls shall not have sharp or protruding screws on the inside of the stall.

10.1.2.8 Accessible washrooms shall clearly bear the International Symbol of Accessibility on the exterior of their outer doors.

10.1.2.9 Directional signs and/or pictograms shall be posted to indicate the location of accessible washrooms.

10.2 Toilets

10.2.1 The upper surface of water closet seats shall be of 450mm in height, measured vertically from the floor surface.

10.2.2 A toilet paper dispenser shall be placed on the side wall nearest the water closet at an approximate height of 780mm above the floor surface. It shall be placed at an approximate horizontal distance of 900mm from the rear wall. The paper roll shall protrude from the wall a distance equalling at least half its diameter when the roll is full.

10.2.3 Water closest seats with spring up action shall not be installed and/or used.

10.2.4 Flushing controls shall be manually operated, push down type and easily accessible to a wheelchair user.

10.3 Other Equipment

10.3.1 The soap and towel dispensers, hand dryer, mirrors, and washbasins located within a fully accessible washroom shall meet the standards listed in this section.

10.3.2 Knee clearance beneath the bottom of a washbasin shall be at least 650mm high (690mm preferred), measured vertically from the floor surface, x 250mm deep, measured from the front of the washbasin.

10.3.3 The upper surface of a washbasin shall have a height of 810mm, measured vertically from the floor surface.

10.3.4 A minimum distance of 450mm shall lie between the centre line of the washbasin and any side wall.

10.3.5 Where mirrors are normally provided, at least one mirror shall be mounted with the bottom edge no higher than 960mm from the floor.

10.3.6 Soap and towel dispensers shall be placed at a maximum height of 1m, measured vertically from the floor surface. They shall be located where they may be easily approached by all people, including those using wheelchairs.

10.3.7 If no water fountains are accessible, a water cup dispenser shall be provided. It shall be placed at a maximum height of 1m measured vertically from the floor surface. It shall be located where it may be easily approached by all people, including those using wheelchairs.

10.3.8 Water pipes which might constitute a burn hazard shall be insulated.

10.3.9 Washbasin faucets shall be equipped with lever type handles.

11. Cafeteria

11.1 At least 5% of seating capacity shall have knee clearance of at least 650mm measured vertically from the floor surface and be able to accommodate persons in wheelchairs. (See Section 10.3.2.)

11.2 Where traffic pattern permits, the food counter must have handrails along each side, far enough apart to permit a person in a wheelchair to pass without difficulty. (900mm.)

11.2.1 No service counter shall exceed 1.1m in height measured vertically from the floor surface.

11.2.2 No protruding, sharp or abrasive surface shall exist under the counter or the tables.

12. Rest Areas

12.1 The seats of at least 5% of the armchairs shall be of 450mm in height and of firm construction and available to the disabled persons; those armchairs shall have removable arms.

12.2 Each vessel must be equipped with at least two wheelchair hold down systems which shall be placed in a general lounge area.

12.3 All furniture shall be hazard-free, having no sharp edges or protrusions.

12.4 All seats shall have armrests sufficiently strong to be used as an aid in standing up and sitting down.

13. Cabins (for vessels that offer them)

13.1 At least 5% of the cabins must be arranged in such a way as to accommodate disabled persons.

13.2 The cabins must have enough space so that a person in a wheelchair can move around without difficulty.

13.3 The doors, bathroom and furniture of the cabin shall meet the standards described in this document.

LUX: A unit of illumination equal to the direct illumination on a surface that is everywhere one meter from a uniform point source of one candle intensity or equal to one lumen per square meter.

NEWTON: The unit of force is the mks system of physical units that is of such size that under its influence a body whose mass is one kilogram would experience an acceleration of one meter per second per second.

APPENDIX F

WHEELCHAIR LIFT SPECIFICATIONS TAKEN FROM CSA-B355-M86

CAPACITY, SIZE, AND RATED LOAD

TYPE		MAXIMUM CAPACITY	SIZE					MINIMUM RATED LOAD, § kg
			MINIMUM WIDTH, mm		MINIMUM LENGTH, mm		MAXIMUM AREA, m^2	
Standing platform		1 person	400		600		0.35	110
Wheelchair-and-attendant platform		2 persons and wheelchair	800*	1200†	1525*	1300†	2.00	250
Wheelchair platform	Unenclosed vertical	1 person and wheelchair	800		1220‡			
	Unenclosed stair		685		1100‡		1.20	180
	Enclosed		800		1200			
Stairchair		1 person	1 chair					110
		2 persons	2 chairs					180

* Applicable to the platforms designed to accommodate the attendant behind the wheelchair.

† Applicable to the platforms designed to accommodate the attendant on the side of the wheelchair.

‡ The length of a wheelchair platform, where the platform is installed on an unenclosed lift and not equipped with a platform gate, may be measured horizontally from one edge to the other of the safety flaps in the elevated position (see Clause 7.6.3) or of the sensitive edges in the non-actuated position (see Clause 7.2.4), as the case may be.

§ See Clause 4.5.2

APPENDIX F WHEELCHAIR LIFT SPECIFICATIONS TAKEN FROM CSA B355-M86